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F. E. Schmitt, Editor

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Research Endowment

AMBROSE SWASEY adds to the high distinction he has won as engineer and citizen by giving another quarter million dollars to the Engineering Foundation. Through this donation he renders the future of engineering research more assured. Technological progress during the next two or three decades will grow mainly through research, for not only our problems but also our tools and materials have become highly complex, and individual effort can accomplish but little in their further study. We shall have to depend mainly on large-scale research, well organized and adequately financed. Just how our future research will be centered and directed is still obscure, for the evolution of methods has only begun. But so long as ample endowment by the present generation places engineering research on a firm basis, methods of direction proportioned to the responsibilities entailed will be developed.

A Teacher Gone

ANOTHER member of the distinguished group of teachers who placed engineering education in the United States upon its present high plane has departed with the death of Professor George F. Swain. At once educator and practicing engineer, he was preeminent as teacher. The thousands of students whose minds he helped to direct along the road of sound engineering thinking are testimony to his genius and success at the professorial desk. That fundamental of effective teaching, intense enthusiasm, Professor Swain possessed in unusual degree. His passing leaves a gap in the circle of great engineering teachers, but we trust only for a time. The memory of his achievements in his chosen profession remains to inspire his colleagues throughout the country's halls of learning, and will awaken greater effort and devotion to the educator's lofty aims.

Adequacy and Economy

WITH all of Lake Michigan at its doors, Chicago last week had to issue warnings of a possible water shortage. The city had suffered from extreme heat for nearly a fortnight, and water was used so generously that on one day more than one and a quarter billion gallons was pumped—probably a high record for municipal water consumption. The pumpage being within 20 per cent of the city's station capacity, the water officials felt anxious enough to issue a warning; as a matter of fact, pressure already had become low in some parts of the city. If anything were needed to support our repeated argument for abundant reserve in water-supply systems, the Chicago incident supplies it. But more than merely adequacy of supply is involved, for such huge per capita figures as the Chicago pumpage of June 29 bear on broader questions of water management. The city is supposed to be committed to a metering program, yet its administration has stubbornly opposed the extension of meters, presumably because water is plentiful and the cost of water waste has never been computed or if computed never adequately considered. When Chicago goes ahead with its filter-plant project, as it must soon do, water waste will loom large in dollar terms, for a plant capable of filtering the present excessive consumption would cost real money. Before the filter plant is built, we predict, metering will be taken in hand energetically.

Delayed Work

MUCH public work projected for this year has not yet been put under contract. Recently we urged the necessity of prompt planning for fall and winter work. Important as this is, the release of projects already planned and financed is even more important. Delays of every kind are allowed to hold up construction, and entire communities are the losers. Dilatory city councils jockey for political position or personal preferment. Picayune bickerings over inconsequential details waste time. New officials cause further delay in learning the machinery of procedure. Again, too much is made of legal points, and courts proceed at snail's pace to render decisions over controversies that hold up millions. Suits by disgruntled taxpayers prevent the use of legitimately voted bond issues. Examples of such procrastination multiply daily—every municipal consultant's office is full of projects held up for reasons of the kind cited or others equally nonsensical. It is time for slow-moving officials, finicky engineers, supertechnical attorneys, officious citizens and quarrelsome politicians to end the destructive procrastination. Every legitimate project pushed to the contract stage now will mean one less make-work job or breadline later on. And if the army of unemployed is not soon transformed into crews of peaceful workers, next winter's breadlines may not be so docile as were those of last winter.

Geology Makes Good

EXPERIENCE has so frequently discredited geological surveys as indices of tunneling conditions that when evidence of their accuracy comes to hand it deserves to be spoken of. It is noted therefore that the Italian geologists diagnosed truly the underground characteristics of the Apennine tunnel described in this issue. This tunnel was a bold undertaking. A double-track bore a dozen miles long is no child's play for tunnel builders under the best of rock conditions. When it penetrates rock formations that are no more stable than earth and that develop squeezes, inflammable gases and water, the task becomes truly formidable. At no time, however,

was there unexpected delay or difficulty in building the Apennine tunnel. The builders were forewarned by the geologists of the conditions they might expect and were not confounded by the conditions encountered. Actual construction proved the geological diagnosis faulty only in slightly underestimating the volume of water to be controlled. The explanation of this accuracy lies perhaps in the thoroughness of the survey. The borings and rock studies were systematically undertaken and continued during the whole period of five years that were occupied in budgeting and organizing the work. It is rare that the ground through which tunnels are planned is studied so thoroughly.

Fresh Air Underground

PROVIDING adequate ventilation is a major problem in the construction of the long tunnels common today. Speedy and efficient tunneling cannot tolerate poor air conditions. The ventilation plant of New York City's 20-mile water tunnel No. 2, described in this issue, was scientifically designed in keeping with the rest of the modern tunneling equipment used on the huge project. With 85 per cent of the driving now completed, the elaborate and well-planned ventilation system has proved its worth. Time saved in getting the crews back into the headings after shooting has paid for its cost; the added factor of protection to the health and comfort of the workmen cannot be measured in money value. Increased efficiency of the crews working in pure air is another intangible but valuable saving. The job results demonstrate the value of engineering design applied to ventilating plants, which modern tunneling cannot afford to ignore.

Another Welding Advance

ONE of the chief claims of economy for welding over riveting rests in the reduced amount of shop fabrication. On several welded buildings a major part of the steel has been shipped direct from the mill to the site and on most of the recent welded designs necessary erection-bolt-hole punching has been confined to the details, eliminating handling of heavy pieces and drilling. Now comes news of a development that promises to eliminate all punching on welded structures. It consists of a so-called erection seat, welded to the columns. Into this seat the connection angles, welded to the beam, may be slipped, the loose connection being firm enough to stay the columns until field welding can be done. No holes are punched. No erection bolts are necessary. On an office building in Lynchburg, Va., where the detail was developed, three tiers of beams were dropped into place before any welding was done. The article describing this work reports a considerable saving over similar construction fabricated with rivets. Elimination of field bolts and punched holes plainly played a part in this saving. The erection seat is an interesting advance in structural welding practice.

Setting Up and Sighting

FINDING and holding a foresight in a crowded street is quite a different task from doing it in an open field, said J. Frederick Jackson recently, speaking before the Connecticut Society of Civil Engineers; it requires ability to adjust one's self to surrounding conditions, to ward off and render harmless the jostling of the passing crowd and to see the target ahead despite distracting objects and adverse conditions. Mr. Jackson took this simple illustration from everyday engineering experience to enforce the statement that an engineer who considers his work as something to be carried on apart from the life of the community in which he lives, in an open field as it were, is not living up to his full responsibilities. Engineers, he said, must take part in the community life about them and must learn to stand up under the difficulties of those who take such part. This advice is especially pertinent at this time when a lot of young engineers are "setting up and sighting" at the start of their career. Colleges have taught them how to set up and sight in an open field. Their future status will depend upon their ability to make a set-up on the street of life, upon how clearly they can see the foresight of service through the buffeting of the crowd, and the accuracy with which they can carry forward their line despite the many obstacles that lie in the way.

Flashboard Dangers

FLASHBOARDS on reservoir spillway crests are installed for the purpose of conserving water above the normal storage capacity without increasing the maximum height to which water is impounded. This is a proper purpose, but only if the proviso respecting maximum water level is scrupulously observed. To use flashboards as a means of raising a dam is dangerous. Accordingly flashboards must never be so installed that they cannot be lowered at a moment's notice when floodwaters have to be passed. H. K. Bell sounds a timely warning to owners of dams in drought-stricken areas who, in their anxiety over low flows, forget that spillways are intended to safeguard embankments from overtopping. It will not be amiss even for engineers to take renewed note of this vital function of spillways. Whoever has responsible relation to a dam should be ever conscious of his duty to know the maximum runoff that the tributary drainage area can furnish, and to provide for this runoff at the dam spillway with a safety factor proportioned to the risks involved. While we are troubled about the dry part of the rainfall cycle, let us not overlook the dangers inherent in the wet years of the cycle. And let us bear in mind the old epigram that fewer dams would fail if the engineer had to build his house at the downstream toe.

Step-by-Step Design

UNFORESEEN developments in foundation conditions often complicate the designing of dams. In some instances they force radical changes in the original design and tax the designer's ingenuity in meeting the new conditions. A good example of the way in which such complications are overcome is found in the Hogan dam, described in this issue. Designs made prior to complete exploration of the site called for a thin arch dam with gravity abutments. In order to get out of the valley before high water the builders started on the central part of the arch before the abutment foundation rock was uncovered, with the result that the design details of part of the dam were fixed before the poor condition of the rock under the gravity abutments was known. These conditions resulted first in much larger abutments than first proposed and ultimately in complete change in the design of one abutment to reduce its size by relieving it of its water load. Designing went hand in hand with construction. Such developments illustrate strikingly the need for adequate engineering control in

the field. Step-by-step engineering is not often necessary on a large scale, but in some measure it characterizes every construction job. If competent field control be not provided it may be dangerous, and in any case it will lead to excessive cost.

A Menace to Public Health Work

CHANGES that have been made and that are contemplated in the sanitary engineering activities and organization of the North Carolina state board of health threaten to destroy much of the notable progress in sanitation that has been made in that state during the past ten years. A bureau of sanitary engineering and inspection already has been reduced to one of merely inspection. At a meeting of the board next week it also is expected that H. E. Miller, who has been the chief engineer of the board for the past twelve years, will be dismissed.

Under Mr. Miller's leadership, North Carolina has won countrywide name and fame for its work in getting municipalities not only to build water-purification and sewage-treatment plants but also to operate them efficiently, which is by far the harder task and one still neglected in many states. To dismiss summarily the man who has done so much for sanitation in North Carolina would be a poor reward for devoted state service; and, quite aside from the personal injustice, would deal a severe blow to public health work throughout the country.

In view of the progressive spirit evinced by the people of North Carolina in the last ten years it seems unlikely that they are aware of what has happened and is pending in the way of disorganization of one of the most important branches of the state's health service. Nor are the moves that are being made in harmony with the record of the present effective administration of that state. Hence, it behooves all who are concerned with the continuance of constructive sanitary work to arouse public sentiment to the situation.

Economy is alleged as the reason for reduction in the activities of the former bureau of sanitary engineering. But since such incentive did not require a change in the name of the bureau the allegation appears specious. Nor has any logical reason been advanced for the curtailment of some of the most important engineering work of the bureau.

Similarly, the contemplated dismissal of Mr. Miller has not been handled in a manner fitting the circumstances. So far as can be ascertained no charges have been publicly preferred against him. Nor has any notice been given of public hearings at which he might defend himself. He evidently will simply be forced to walk the plank for reasons known only to the board, unless the people of the state are aroused to the setback to sanitation which such action would bring.

Back of these moves against the engineering activities of the state board of health, and particularly against its chief engineer, there appear grounds at least for suspicion of jealousy on the part of some of the leaders of the medical profession of the state. This jealousy seems to have been aroused largely by the effective results secured by the engineering and inspection work at moderate cost. It also may be traceable to the fact that an engineer has shown how greatly typhoid fever and other infectious diseases may be reduced by better sanitation.

Several times in the past serious charges apparently traceable to the medical profession have been lodged against Mr. Miller. When brought to hearing no grounds for such charges have ever been produced. Now a new board is in office, with medical men predominating, and its actions seem to prove that it does not mean to let an engineer continue to advance the sanitation of the state, nor even to give one of the state's most valuable servants a chance to defend himself publicly. It will be of importance to the engineering profession and public health workers generally to see whether the administration in power in North Carolina and the people of that state can be aroused to a realization of the menace to public health and sanitation of such a policy of negation and destruction.

Building Moving Progress

THE housemover's art approaches exact science in such operations as the moving and turning of the Indianapolis telephone building, described last week. Memory records no heavier building ever moved, nor one that required such precise handling to avoid disturbing delicate processes carried on within. These are the conditions that make the description of procedure notable.

Functionally the general procedure in moving buildings has changed little during the generations; the structure is mounted on rollers and pushed or pulled to its new location. Improved jacks, steel rollers, wire cables and power hoists have replaced wood and rope and animal power, but aside from changed materials and power the devices employed are the same. The essential advance has been made in precision of moving processes.

The moving of the Indianapolis telephone building, for example, was preceded by tests and computations as precise as those required for the structural design. The tests of steel balls and steel rollers to determine comparative rolling resistance and track depression add new facts to the knowledge of the mover and confirm past experience in proving the superiority of a multiplicity of free rollers as carriers for heavy articulated loads on distributed supports. Nothing surpasses this primitive wheel for ease and precision of guidance and flexibility of load distribution.

In passing merited credit to the building mover's skill as displayed in the Indianapolis operation and others of recent years, memory casts back 35 years to the observation of the first use of steel rollers in a moving operation but little if any less difficult than that of the Indianapolis telephone building. This was the moving and raising of the Emanuel Baptist Church in Chicago, in 1896. With virtually all of its 6,230 tons weight carried on four masonry walls cut by high Gothic windows and doorways, and with a tower and spire 210 ft. high, this building was moved without a crack in the plastering or a loosened shingle by H. H. Sheeler, an old Chicago housemover, who had only empirical knowledge to guide him in the elaborate bracing and track construction required.

With accomplishment equally perfect, the compact and simple steel carriage and track structure at Indianapolis contrasted with the forest of massed timberwork at Chicago typify the progress of a generation of building moving. The old operation was a success through multiplication of precautions and excess of safeguards, the new because of calculated application of engineering knowledge.

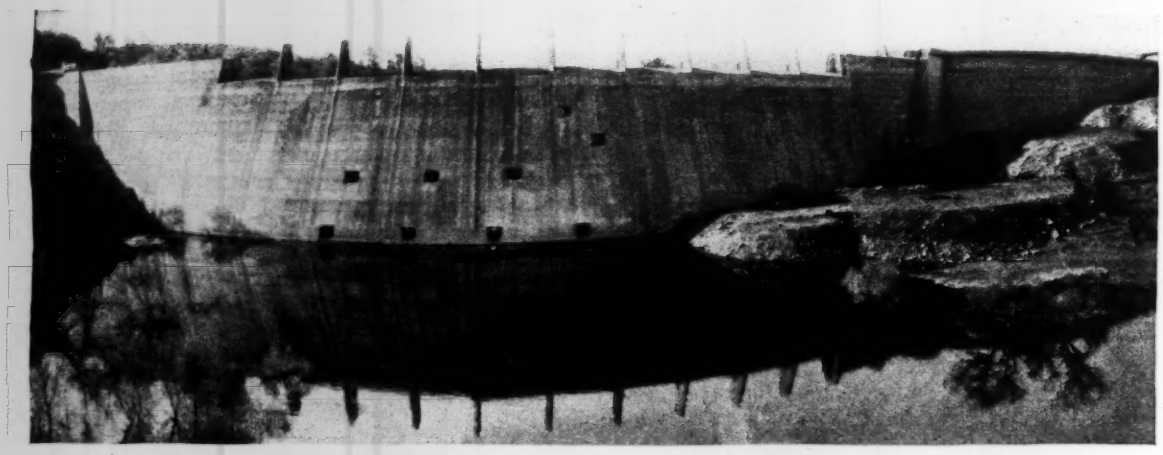


Fig. 1—Upstream face of Hogan Dam, showing uncontrolled discharge openings

Three Types of Design Used in California Flood-Control Dam

Variable-radius arch, straight and curved gravity sections and earthfill employed in Hogan Dam on Calaveras River

By RALPH G. WADSWORTH
Associated With Fred H. Tibbetts, Civil Engineer, San Francisco, Calif.

COMBINING several unusual design and construction features, the Hogan Dam, recently built by the city of Stockton, Calif., is the first major flood-control structure on the Pacific Coast north of the southern California region. It is 137 ft. high above lowest foundation and embraces three separate types of construction: variable-radius arch with massive gravity-abutments, rolled earthfill, and standard gravity sections, both straight and curved. The resulting flood-retention reservoir has a capacity of 76,000 acre-ft. at the elevation of the overflow crest and is used at present entirely for flood control.

Purpose—The primary purpose of the dam is to create a detention reservoir for the control of winter floods in the Calaveras River, which flows west from the foothills of the Sierra Nevada directly toward Stockton, situated on the San Joaquin River. Past floods have seriously damaged the intervening agricultural area, and the city has at times been seriously threatened. The maximum flood of record occurred in January, 1911, when the discharge reached 80,000 sec.-ft. for a few hours.

The dam has ten uncontrolled openings, nine 78 in. and one 36 inches in diameter. The large openings are placed at four different levels and are provided with bell mouths of square section to permit future installation of gates if found to be desirable in affording better regulation of discharge at high reservoir stages. The 36-in. opening is located close to streambed level.

A secondary use of the dam has been proposed by the Linden Irrigation District, which includes about 13,000 acres of land now largely irrigated from wells and faced with the problem of a falling water table. Studies prepared by Fred H. Tibbetts, engineer of the district, show that the city could dispense with the bottom 7,900 acre-ft. of storage capacity between the middle of March and the middle and January and that, by utilization of this storage, streamflow could be regulated to increase percolation in the vicinity of the district without impairing the reservoir's usefulness for flood-control purposes. Negotiation of a suitable contract between the district and the city has been delayed by the intervention of riparian land-owners along the river below the dam. Consequently, the dam for the present will be used solely for flood-control purposes.

General Description—The arch, which is the main part of the dam, is of the variable-radius type with a maximum height of 136.5 ft. above the foundation and 127 ft.

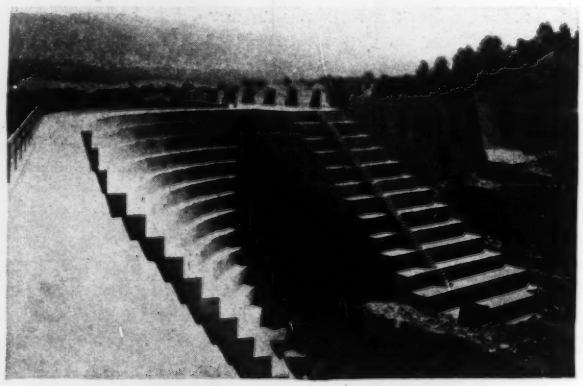


Fig. 2—Downstream face looking south
The side dam was adopted to relieve the abutment of part of the water load.

above streambed. The radius of the upstream face at the crest is 349.2 ft., and the length between abutments is 616 ft. Its distinctive feature is the pronounced overhang at both crown and abutments.

The arch is flanked on both ends by gravity abutments. On the south bank, which has a slope of about 30 deg. with the horizontal, the abutment consists of an enlarged prolongation of the arch extending approximately along the tangent and terminating in a reverse curve and short gravity wing wall. On the north bank, which is much flatter, the arch thrust is resisted by a large independent gravity buttress. Branching from it with a short-radius curve, a gravity wing dam (carrying only the water load) extends up the hill to a junction with a final short length of earth embankment. The relation of these various sections is shown in Fig. 3.

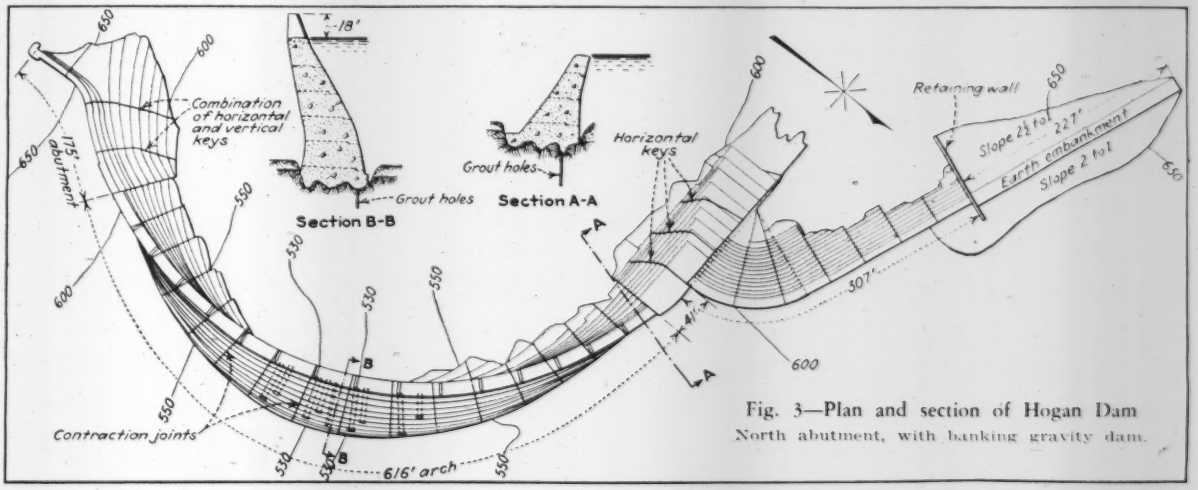


Fig. 3—Plan and section of Hogan Dam
North abutment, with banking gravity dam.

The volume of concrete, in cubic yards, contained in the various parts of the structure is as follows:

Arch	77,500
North abutment	16,700
South abutment	10,200
Gravity sections	17,900
Total	122,300

Design

Limitations—Design of the dam was a continuing process throughout the entire period of construction. Maps of expected foundation contours varied greatly from week to week as excavation proceeded, and designs, particularly for the abutments, were continually changed to conform. This procedure is a perfect illustration of the generally accepted fact that a dam, especially an arch dam, cannot be completely designed until the excavation has been finished. Conversely, of course, the excavation cannot be made until the dam has been designed, and the deadlock is complete. One obvious solution, aside from the successive trial method employed at the Hogan Dam, is to complete the excavation first on the lines of an approximate design and then prepare complete and final plans. This procedure has actually been followed in the case of at least one dam in California.

The contractor on the Hogan Dam was somewhat delayed by litigation at the beginning of construction and, desiring to complete the portion of the structure in the stream channel in the limited period prior to the flood season, concentrated his force on that part of the work, consequently postponing foundation excavation at higher levels. When the foundations for the abutments were finally uncovered the arch was nearly complete, which precluded any redesign or relocation of that part of the structure.

The design also was slightly handicapped by the position of the construction plant, which included a long trestle about 60 ft. high and a 380-ft. steel elevator tower located close to the original lines established for the structure. As changes were required by newly discovered foundation conditions, every effort was made to avoid interference with completed work. However, it became necessary to reconstruct part of the trestle and place special steel shoring under one corner of the concrete plant.

A further change in plan was required after construction was well advanced, when it was found that increased size of abutments, due to unexpected depth of excavation, was certain to increase the cost of the dam beyond the limits of bond funds available. It was accordingly decided to reduce the height 20 ft. with the necessary provisions to permit future completion.

Arch Design—The crest of the arch was originally fixed at El. 674, which is about 145 ft. above streambed. Arch rings were designed to carry full water load without tension at any point, and with a compressive stress not exceeding 600 lb. per sq.in. The height of the entire arch was later reduced, and a portion of the crest was still further depressed to form a spillway, but the lower arch rings were constructed of the full thickness originally required.

In addition to stress requirements, the arch rings were laid out by trial to provide an overhang of not more than one horizontal to five vertical, which resulted in substantial economy of material. Although no precedent was found for this degree of overhang, it was feasible structurally and the principle has been approved in current discussions of dam design. The limit specified was fixed largely by the contractor's offer to make no extra charge for inclining the formwork to that extent.

The maximum overhang of the crest at the crown of the arch, if constructed to the full height first proposed, would have been 24 ft.; as built, the maximum is actually 17 ft. To this downstream overhang at the crown

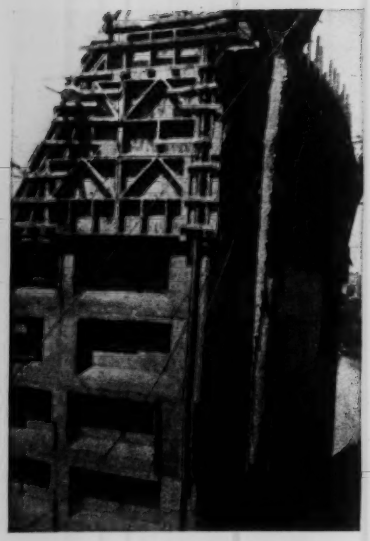


Fig. 4—Keyways in south abutment

This special joint treatment was evolved to transmit both vertical and horizontal shear.

there can be no theoretical objection, since any deflection of vertical elements due to weight is immediately resisted by arch action, probably in a diagonal direction. At the abutments, however, where the overhang is upstream with a maximum amount of about 11 ft., there might appear to be some instability when the reservoir is empty. As a matter of fact, all of the overhang is confined to the single block between the abutment and the first construction joint, and this block is keyed in thoroughly to adjoining blocks. Of course, in no case does the vertical through the center of gravity of the block fall outside the base, although it does fall outside the middle third.

Actual design of the arch included a determination of flexure stresses in the vertical cantilever at the crown, based on an adjustment of water load between arch rings and cantilever to produce identical deflections in both at any elevation. The cross-section was adjusted by trial to limit the compressive stress at the base of the cantilever to 600 lb. per sq.in. Final analysis after several trials and adjustments of sections, based on the full ultimate height of the dam, showed a maxium compressive stress of 530 lb. per sq.in. at the toe and a maximum tensile stress of 360 lb. per sq.in. at the heel. The tensile stress was considered of little significance, since horizontal cracking that might result would simply weaken the cantilever and throw more than the assumed partial load on the arch, which is amply strong to carry the full load if required.

Construction joints were provided in the arch at intervals of about 40 ft. The joints were constructed as plane surfaces passing through the approximate average of the radii to all of the arch rings intersected. Joints were provided with vertical keyways to aid in transmitting shear from one block to the other and with split-pipe networks to permit grouting after final shrinkage of the concrete.

Design of Abutments — Design of the gravity abutments was by far the most complicated and arduous part of the work. Each is subject to at least five separate forces, no two of which intersect. The four known forces are: (1) arch thrust; (2) water load; (3) uplift due to water pressure on the base; and (4) force of gravity, all of which are either vertical or horizontal. The resultant of these forces, which is equal and opposite to the reaction of the foundation, in general, cannot be reduced to a simpler form than a single force and a single couple, or two non-coplanar forces.

The design of the abutments was a matter of successive approximation to determine the best location, size and proportions. Each trial involved computations of pressure on planes at several levels and for each level a determination of the center of gravity of the section, the principal axes, the moments of inertia about the two axes, the moments of the forces, and finally the normal stresses at extreme points in the boundary of the section.

The south abutment was laid out as a prolongation of the arch for the distance necessary to give the required abutment action, and served the double purpose of resisting arch thrust and carrying water load. This arrangement was impracticable at the north end, where, due to excessive depth of excavation, the final height of the abutment was found to be 84 ft., as compared with the 72 ft. assumed when the arch layout was made. The additional height not only greatly increased the arch thrust and water load but also deflected the pressure resultant toward the river to such an extent that shifting of the base downhill on a sloping foundation would have been required. To avoid this, a large part of the water load was removed from the abutment by constructing a branching wing of gravity section, so isolated from the abutment as to prevent any transference of stress. This was accomplished by leaving a clear space of 2 in. between the two structures, the gap being closed by a copper water seal at the upstream side only. All rear faces were stepped to aid future enlargement, and the full area of the ultimate foundation area was covered to the depth of one pour to protect it against future weathering.

Construction joints were provided in the abutments

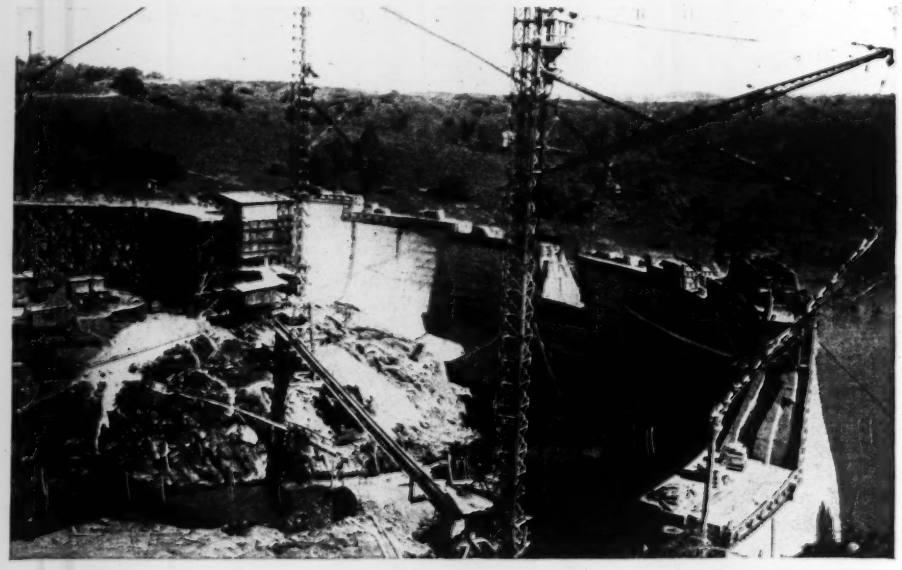


Fig. 5—Construction plant and concreting equipment

The near hoisting tower was supplied by conveyor belt from concrete plant in background.

at intervals of about 40 ft., and the same provision was made for grouting as in the case of the arch. The joints were constructed as warped surfaces in such a way that, at any elevation, the line of the joint was approximately normal to the resultant horizontal thrust acting at that elevation. The trace of the joint on the upstream face is a vertical line, while on the downstream face it is inclined backward from the arch, thus giving the appearance of being roughly normal to the total resultant transmitted from block to block.

Keyways were provided in all joints. In the north abutment, where the horizontal load is practically straight and axial, the keyways were laid horizontally, since the shear between any two blocks is essentially vertical. In the south abutment, which is subject to both water load and arch thrust and where consequently both vertical and horizontal shearing stresses may occur between blocks, a system of intersecting keyways in two directions (resembling a waffle iron) was devised.

Spillway—The aggregate discharge of the ten openings through the dam under maximum head is estimated to be 15,000 sec.-ft. As a protection against overtopping of the abutments, further capacity was obtained by depressing the crest of the arch and providing a rounded overflow lip and aerating piers. The central 346 ft. of the crest was set 11.5 ft. lower than the parts on either side to concentrate moderate discharges in the riverbed. The overhang of the structure is of marked advantage in this connection because it tends to project the overfalling sheet of water beyond the foundation. The crest is designed to prevent overtopping of the abutments in the event of a flood equivalent to 150 per cent of the maximum flood of record.

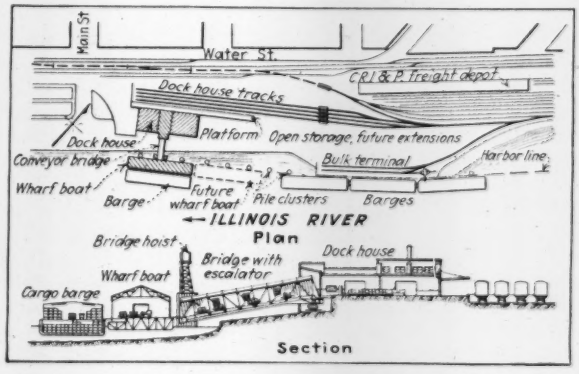
Personnel — The Hogan Dam was designed by the writer under the direction of Fred H. Tibbetts, consulting engineer for the city of Stockton, with the assistance of E. E. Blackie and M. L. Dickinson. Construction work was carried out under the supervision of Lyle Payton, city engineer, Stockton, and William S. Post, resident engineer. Bent Bros., Inc., of Los Angeles, was the contracting firm.

The dam was one of the first to come under the new California law giving the state engineer complete supervision over all dam construction. When unexpected foundation conditions indicated that extensive revision of originally approved plans would be necessary, the state engineer's deputy in charge of dams, George W. Hawley, engaged W. L. Huber, of San Francisco, as special consultant. The subsequent rapid revision, checking and approval of plans was carried out through the cooperation of the engineering staffs of state and city in such a way that there was no friction or delay or additional cost to the contractor.

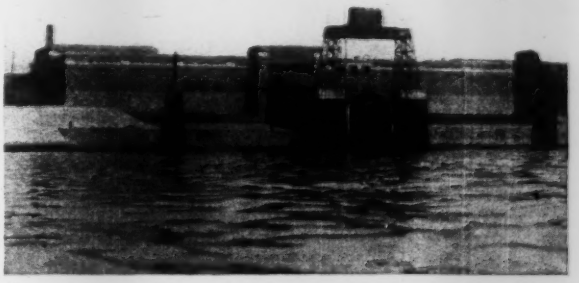
The dam was named in honor of Walter B. Hogan, who was city engineer when the project was instituted and city manager when it was consummated.

Peoria Opens Municipal Rail-and-Water Terminal

A MUNICIPAL rail-and-water terminal at Peoria, Ill., opened for traffic on June 15, consists of two separate units for package freight and bulk freight, both located on the wide reach of the Illinois River known as Peoria Lake. For package freight there is a brick and concrete dock house served by a 400-ft. platform and four stub tracks on the land side. This building is connected with a wharf boat by an inclined covered bridge, which carries a chain conveyor for handling trucks between the boat and the house. The outer end of the bridge is suspended from an overhead structure by cables with an electric hoist, by means of which the bridge is raised or lowered to adjust it to variations of water in the river. An open space for storage extends a short distance upstream to a wharf and river wall with a 25-ton locomotive crane for handling bulk freight and heavy materials directly between cars and barges.



Municipal waterfront terminal, Peoria, Ill.



River-rail terminal, Peoria, Ill.

Freighthouse with hinged conveyor bridge. A wharf boat (not shown) is moored at bridge to facilitate transfer of freight to and from barges. An overhead frame carries a hoist for adjusting the outer end of the bridge to varying water levels.

There are two stub tracks on the wharf, and all terminal tracks are connected with the Chicago, Rock Island & Pacific Railway under an agreement that gives all other railroads access to the terminal by paying interest on investment and a wheelage charge. In this way the city has the equivalent of a belt-line service between all the several railroads and its rail-and-water terminal, with a single switching charge.

This new terminal will be used by the Inland Waterways Corp., which now operates the Federal Barge Line on the Mississippi and Warrior rivers. Other common-carrier boat lines have applied to the Interstate Commerce Commission for permission to operate on the Illinois River as a part of the lake-and-gulf waterway. The terminal, designed by and built under the direction of Jacob A. Harman, Inc., consulting engineers, Peoria, Ill., was financed by the city as a municipal enterprise.

Crack Occurrence and Control in Concrete Pavement

Design for direct stress will largely eliminate cracking—Sealed joints and embedded steel to keep cracks from opening—Supplementary requirements

By CLIFFORD OLDER
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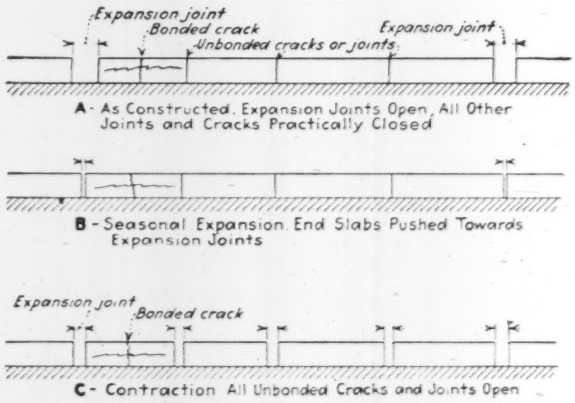
SUPPLEMENTING his notable discussion of joints in concrete pavements, published in our issue of Oct. 2, 1929, p. 530, Clifford Older considers here the fundamentals of crack control in concrete slabs for either pavement or pavement bases. Concrete bases are generally employed for main-street city pavements having brick or bituminous surfaces. As either surfacing reflects quickly any open cracking of the base slab and as this cracking cannot be repaired until surface damage discloses its location, crack control in concrete base is more vital than in concrete pavement. Recent concrete base-slab design shows many tentative devices for crack control and generally a keener appreciation of the fact that base construction is as intricate a problem as any in paving engineering. Mr. Older considers fundamental causes and effects of cracking rather than specific construction devices for crack control. The discussion is inspired by the notable survey of practice prepared for the American Road Builders Association by the committee on subgrades and pavement bases. —EDITOR.


Expansion joint
Bonded crack
Unbonded cracks or joints
Expansion joint
A - As Constructed. Expansion Joints Open, All Other Joints and Cracks Practically Closed
B - Seasonal Expansion. End Slabs Pushed Towards Expansion Joints
Expansion joint
Bonded crack
C - Contraction. All Unbonded Cracks and Joints Open

Effect of seasonal expansion on joint action in concrete pavement

CHECK CRACKS, once so prevalent, that occur during or immediately following concrete slab or base construction, may be greatly minimized by precautions taken during construction. Longitudinal cracks may be almost completely eliminated by the simple means of dividing the slab into comparatively narrow strips.

Transverse cracks that occur after the pavement has been opened to traffic present an entirely different problem. They may or may not detract from immediate serviceability, but their influence on ultimate life and annual maintenance cost is of serious concern for two primary reasons.

First, they transverse the thin mid-portion of thickened-edge slabs or bases; and therefore, if not thoroughly doweled or prevented from widening during contraction, they expose the adjacent slab edges to destructive live-load stresses.

Second, if not prevented from widening by bonded wire mesh or bars or kept permanently sealed by other means, nightly and seasonal contraction encourages the more or less rapid filling of the open crack with incompressible silt or soil. Upon re-expansion, cracks wholly or partly filled with soil cannot again completely close and the adjacent sections or a whole series of them will be pushed toward the nearest expansion joints. This action, repeated many times during the early life of the pavement, sooner or later completely closes the expansion joints and defeats their purpose of relieving the pavement from excessive compression stresses when the temperature or moisture content rises and the pavement expands. Crack control is therefore a matter of prime importance.

If we consider a pavement having expansion joints at intervals of say 200 ft., with one or more transverse cracks or construction joints between, we may assume that, except at the expansion joints, all adjacent sections when first constructed will be in contact, or nearly so. This may be illustrated by sketch *A*, Fig. 1.

At the first period of maximum seasonal expansion all intermediate cracks and joints will be closed in so far as soil filler will permit, and the entire series of sections will have been pushed toward the expansion joints. The expansion joints will then have closed an amount equal to the actual aggregate longitudinal expansion of the series of sections, plus the aggregate compressed thickness of any soil, particles of broken concrete, etc., that may have entered the cracks and joints in the meantime, less the amount the cracks and joints have been opened by initial shrinkage. This condition may be illustrated by sketch *B*, Fig. 1.

Following this condition, the next period of contraction will cause the intermediate cracks and joints (if there is no tie steel) to widen exactly the same amount as the expansion joints, providing slab lengths are equal and subgrade friction is uniform. This is true because each individual unbroken section will contract toward its own mid-length as an independent unit. The relative amount each crack or joint actually opens will, of course, depend upon the length of the adjacent pavement sections and whether or not subgrade friction is uniform throughout the length of each section. This condition is illustrated in sketch *C*, Fig. 1.

It is obvious that after this cycle of expansion and contraction all such untied cracks and all untied joints—whether originally constructed as expansion joints or not—will function to exactly the same extent in relieving compressive stresses as the original expansion joints, provided they are kept as free from incompressible material. It is just as certain that if such intermediate cracks and joints are permitted to accumulate incompressible material, the ends of the slabs adjacent to the original

expansion joints will eventually be forced into contact, and there will then be practically no expansion relief, regardless of how perfectly the original expansion joints may have been constructed and subsequently maintained.

Joints Must Be Sealed and Cracks Tied Together With Steel

Providing for the future functioning as expansion joints of intermediate joints and untied cracks is obviously just as important as original expansion-joint provisions. The prime importance of this fact is not often given the weight it deserves in present design practice.

Practically the same means may be used for retarding or wholly preventing the entry of foreign material into construction joints as may be used for expansion joints. The most obvious expedient for concrete pavements is to round the edges, the groove thus formed serving as a reservoir to hold a limited supply of bituminous material below the pavement surface, where it will be more or less protected from dissipation by traffic and available partly to fill the opening when contraction occurs. The most casual computation of joint opening, however, will indicate the inadequacy of any such reservoir. Means at least equal to this simple provision should certainly never be neglected.

Difficulties arise in finding a bituminous or other plastic filler sufficiently adhesive so that it will not pull away from the concrete during contraction and leave voids to become filled with dirt; ductile enough at low temperatures so that it will not crack during cold-weather contraction, again leaving voids; soft enough when cold so that material forced out by previous expansion will flow back during contraction; stiff enough during hot weather not to flow from the crown to the edges, and yet not stiff enough to offer undue resistance to expansion or to form objectionable ridges when the excess is forced above the slab surface by hot weather expansion. It is needless to say that such a plastic material has never been found and probably does not exist.

The practical impossibility of keeping all transverse openings even approximately filled at all times with any kind of plastic material may be appreciated by computing for a given period of time the cumulative one-way longitudinal displacement of a 7-in. concrete pavement 20 ft. wide and a mile long. Assuming an effective coefficient of expansion of 0.000005 per degree F., a daily range of pavement temperature of 20 deg. F. (often exceeded), a yearly range of 100 deg. F., and even neglecting moisture variations and intermediate seasonal temperature fluctuations, the aggregate longitudinal displacement reaches the surprising figure of about 2,280 cu.ft., or approximately 17,000 gal. per mile per year. Of course no such quantity of plastic filler is ever supplied.

When a plastic filler is used in joints, some of that which is forced out by the daily expansion may find its way back at night, probably carrying more or less soil with it. The net result is a gradual substitution of soil for bitumen in the joint. Soil filling is probably more rapid during the wider seasonal or yearly cycles and of course depends upon joint design and the thoroughness of maintenance methods.

The difficulty of excluding inert material from uncontrolled cracks where there is no tie steel is far greater than in the case of joints, as in this case no reserve supply of crack filler can be maintained, since there is no preformed groove or recess to hold it. Any surplus is merely flattened over the adjacent surface and dissipated by traffic.

The control of transverse cracks is therefore of paramount importance if we are to avoid excessive compressive stresses throughout the life of the pavement.

That "blow-ups" are the immediate result of excessive longitudinal compression is not questioned.

That ultimate pavement life (to say nothing of spalling and upper-layer disintegration) may be materially shortened by compressive stresses, induced by expansion, which alone or combined with wheel-load stresses may often exceed the fatigue or endurance limit of the concrete, would seem to be certain. Unfortunately, we have as yet no exact yardstick with which to measure pavement life or maintenance costs.

Designing for Direct Stress Helps to Control Cracking

When we learn how completely to avoid excessive tensile stress we need have no cracks. Tensile stress set up in the completed and cured pavement or base by subgrade friction during periods of contraction may easily assume serious proportions, and it is believed that if a reasonable allowance is made for this, as well as for traffic-load stress, a very large percentage of all transverse cracks will be eliminated.

The subgrade friction tests made by A. T. Goldbeck some years ago place within our reach a reasonably definite means for evaluating this stress. These tests show that the coefficient of friction for almost any subgrade may at times reach the magnitude of 1.5 or 2, or even more. If we assume that concrete weighs 144 lb. per cubic foot (a figure close enough, considering the probable error in assuming the coefficient of friction for any given case) and that subgrade friction is uniform, it may easily be shown that the unit stress on any transverse cross-section in a pavement of uniform thickness (longitudinally) may be determined by the simple formula $f_c = cl$, in which f_c = unit stress in lb. per sq.in., c = the coefficient of friction and l = distance in feet to the nearest free slab end.

On a cross-section at the mid-length of the slab the unit stress in lb. per sq.in. would be greatest and would therefore equal the length of the slab in feet for a coefficient of friction of 2, 0.75 of the length for a friction coefficient of 1.5, etc.

It is well established that the fatigue or endurance limit of concrete subject to repeated loads in bending is about 50 per cent of the modulus of rupture as ordinarily determined, and it is now recognized as a fundamental requirement that fiber stress must be kept at or below this limit. Formulas are available and in use by means of which at least approximate tensile fiber stresses may be determined when wheel loads are known and much is known of the expected modulus of rupture of paving and base mixes. We have, therefore, at least an approximate basis for mathematical design supported by research and experience, which may not be in greater error than at least some of the assumptions made in the design of other important engineering structures.

The importance of considering the direct tensile stress set up by subgrade friction may best be illustrated by a concrete example. Assume that in a given case the modulus of rupture is 650 lb. per sq.in. The endurance limit in this case would be about 325 lb. per sq.in. If then, we space transverse joints say 150 ft. apart and the subgrade friction coefficient is 2, the direct tensile friction stress during contraction would be 150 lb. per sq.in. on the cross-section half way between the slab ends. This is more than 46 per cent of the total available working stress, and it prevails over the entire cross-section.

If now, the design is such that the wheel loads alone induce tensile fiber stresses in the under surface equal to the endurance limit (325 lb. per sq.in.), the combined direct and fiber stress under the wheels at the mid-section would be about 475 lb. per sq.in., or approximately 73 per cent of the modulus of rupture.

Fatigue tests indicate clearly that a relatively small number of repetitions of even a materially less percentage of the ultimate will inevitably cause fatigue failure.

As we cannot prohibit traffic during periods of contraction, the eventual cracking of a slab or base so designed is therefore a foregone conclusion, providing only that traffic ultimately does impose a certain number of the wheel loads assumed in design, even though the computed wheel-load stress may be considerably in error.

It is submitted that while the unit stress induced by subgrade friction is virtually independent of thickness and that thickness therefore has no bearing on the average spacing of transverse cracks prior to traffic use (and may have little even after opening to traffic if the loads remain relatively light), yet as it is a limiting factor in holding the combined tensile stress at the mid-length under the fatigue limit, it has an exceedingly important bearing upon the occurrence and spacing of the transverse cracks in pavement subject to increasing traffic loads. This is true even though the subgrade support may be absolutely uniform.

Such cracks should appear at or near the mid-length of the slab, because of the fact that the combined stress is normally greatest at this point.

The subgrade of the Bates test road was perhaps as nearly uniform as it is humanly possible to obtain, and yet as the wheel loads were increased from time to time, numerous new transverse cracks appeared even in the 25-ft. sections into which a portion of the concrete pavement was divided. Moreover, it is significant that 75 per cent of the cracks in the 25-ft. sections occurred within 3 ft. of the mid-length and the average off-center distance (right and left) was only about 2¼ ft. Transverse cracking is obviously so largely influenced by wheel loads that, lacking a knowledge of the actual traffic loads, crack counts for existing pavements having given thickness are likely to be utterly valueless as a general guide to proper joint spacing.

Data so far gained from crack observation is so rarely correlated with a knowledge of actual traffic loads that it would seem at present that the only reasonably safe practice is to provide flexual strength such that the combined wheel load and direct subgrade friction stress may be safely below the endurance limit. To accomplish this purpose it is proposed that the working stress used in any formula for thickness be taken as not more than one-half (preferably 0.3 or 0.4) of the modulus of rupture less the unit friction stress. The familiar corner formula (used as a basis for thickness throughout the slab) would then become

$$t = \sqrt{\frac{3w}{0.4m - f'_c}}$$

in which t = thickness, w = wheel load, m = modulus of rupture and f'_c = unit subgrade friction stress (= slab length in feet for a coefficient of friction of 2).

It is believed that while provisions in design for the direct stress caused by subgrade friction and that caused by traffic loads will eliminate a large per cent of all cracking, yet as there are other causes of stress, some cracks are practically sure to appear.

To minimize the deleterious effect of cracks that may be caused by conditions not easily evaluated or even anticipated, it is believed that the embedment of a welded mesh having the area of steel in each direction proportioned to slab dimensions and subgrade friction is well worth its cost. While embedded steel no doubt promotes other ultimate economies, it is believed that its effect in keeping erratic cracks tightly closed, thus eliminating the evil effect of dirt accumulations and insuring a high degree of doweling action between adjacent sections of roughness interlock, is alone sufficient to justify its use.

Special Precautions for Base Slabs

The previous discussion applies largely both to concrete pavements and concrete bases designed to support more rigid wearing surfaces. Inasmuch as when a concrete base is used to support a non-rigid wearing surface it furnishes the chief flexual-strength element necessary properly to distribute traffic loads to the subgrade, the principles of design relating to relief from compressive stresses, allowance for subgrade friction and wheel-load stresses apply alike to concrete pavements and concrete bases.

The joints used in bases for brick pavements having a sand cushion should be particularly well protected against the entry of foreign material, as the sand cushion is always present to furnish incompressible filler. In addition, leakage of sand into joints or cracks disturbs the wearing surface. The use of a proper mastic cushion should tend to eliminate this danger.

With asphalt surfaces the wearing course may bridge a moderate width opening, and to a certain extent aid in the exclusion of surface soil. The surface, however, is sure to crack over or near the joint, and provisions should therefore be made in construction for the permanent exclusion of soil from the base joints.

In both brick and asphalt pavements it is essential that all transverse joints be of the expansion type and not too widely spaced. If, in an attempt at economy, expansion joints are used at relatively wide intervals either with or without intermediate contraction joints, the first hot-weather expansion will all be concentrated at the expansion joints, and the relatively great movement at widely spaced expansion joints is likely to result in a serious ridging or buckling of the wearing course at that joint. It is hardly necessary to say that a plastic-base joint filler should never be used, as it will be forced out during expansion with disaster to the wearing course.

From the considerations herein discussed it seems logical to conclude that thickness, the design and spacing of joints and the use of tie or bonding steel have a very great bearing upon the control of transverse cracks and therefore upon the economic functioning of so-called rigid pavements of all types.

New Bridge Opened Over the Nile

The road and rail bridge which spans the Nile at Jinja, East Africa, was formally opened late in January. The structure will enable the Kenya & Uganda Railway to be extended to Kampala, the commercial capital of the Uganda protectorate. The bridge consists of a spandrel-braced arch, 260 ft. 2 in. long, with a 100-ft. approach span at each end. It is the only bridge crossing the Nile between its source and Kosti, 1,300 miles down stream. It was first completely erected on its own bearings in the contractor's yard in England, in order to prove the accuracy of the work, and was later dismantled and shipped to Africa in sections.

Tests of Load Transmission Across Joints in Concrete Pavement

V-plate center joint with dowels effective—Doweled bituminous transverse joints not effective—Proposed slab-end reinforcement for transverse joints

By SEARCY B. SLACK
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TO BE EFFECTIVE in transmitting stress from one section of a paving slab to another section, a transverse or center joint should transmit deflection across the joint. If a heavy load is applied on one side of the joint and if the joint is effective, it will cause deflection on both sides of the joint.

Working on this principle, the relative movements between the opposite sides of various types of joints in concrete pavement have been measured. A heavy load was applied on one side of the joint by means of a jack-type loadometer. The relative movement of the two edges of the paving slab at the joint or crack was measured by means of Ames dials mounted on a 14-ft. straight-edge. The straight-edge was supported at each end by adjustment screws, so that the readings of the dials could be set and regulated. The types of joint tested were as follows:

1. Doweled center joint of the usual V-type. This joint was formed by a 5½-in. strip of 16-gage metal, with a V-deformation 1½ in. deep by 3 in. wide stamped in the metal. Passing through the joint were ½-in. round dowel bars 4 ft. long and 4 ft. c. to c.

2. A 2-in. open joint across the pavement. No dowels through the joint, edges of the slab were free to move.

3. Ordinary transverse crack about 1/16 in. wide. Measurements were made about midway between the center joint and the edge of the pavement.

4. Doweled transverse joint. The joint was formed by a ½-in. strip of bituminous felt, through which were passed ¾-in. round smooth bars 4 ft. long. The bars were spaced 2 ft. 8 in. c. to c. One end of the bars was dipped into heavy grease, and an expansion sleeve was placed over the end of the bar.

All measurements were made on typical concrete pavement, as constructed by the state highway board of Georgia. This pavement is 9 in. thick at the edge, 6 in. thick at the center and 20 ft. wide. Details of the old and proposed new joint are shown on the accompanying drawing. Measurements in the accompanying table show deflection in ten-thousandths of an inch for a load of 10,000 lb.

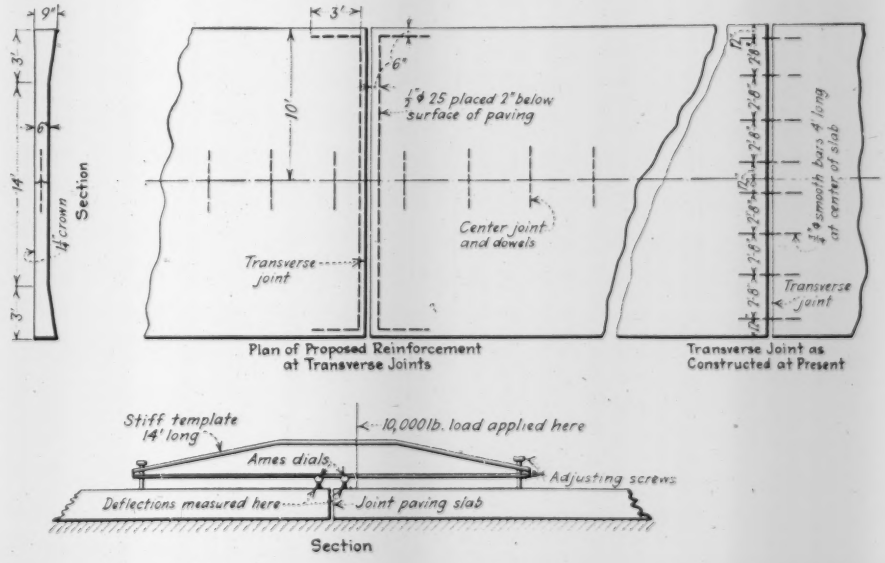
The measurements indicate that the V-type center joint with dowels is very effective in transmitting deflection from one side of the joint to the other. It also indicates that dowel bars passing through ½-in. bituminous material are not effective.

TRANSMISSION OF DEFLECTION ACROSS JOINTS

Where Made	Deflection on Side of Load	Deflection on Side Away From Load
Center joint	64	60
	50	40
½-in. expansion joint	61	1
	230	10
	82	31
	118	12
	170	32
2-in. expansion joint	200	15
	190	35
	200	25
	192	35
	202	12
Transverse crack	160	40
	135	60
	155	81
	165	55
	158	65

Dowel bars through a transverse joint make it difficult to spade the concrete properly adjacent to the expansion joint, and frequently honeycomb or stone pockets occur below or adjacent to the bars. These stone pockets or honeycombed areas further weaken the unsupported edge of the slab.

Based on these observations, a proposed method of reinforcing edges of paving slabs adjacent to transverse joints is suggested in the accompanying drawing. Placing the steel as suggested will reinforce the edge of the concrete slab adjacent to the transverse joint and will strengthen the corners of the slabs by reinforcing them along both edges. The steel is spaced a sufficient distance from the transverse joint to permit of spading the concrete against the joint.



Testing transmission of deflection across joints with proposed reinforcement of slab edges at joints

Increasing Stormwater Inlet Capacity by Improved Gutter Approaches

Experimental study leads to a definite design of depressions at inlets and a method of calculating capacity

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and
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LACK of established data on the design and capacity of storm-drain inlets prompted a recent series of investigations by the bureau of engineering of Los Angeles for the purpose of increasing the efficiency of these devices. After several years of study, results have provided bases for definite design of the approach section and data for the determination of inlet capacity under various street conditions. The importance that attaches to the correct field construction of inlets, as shown by the tests, has resulted in a plan to have the field layout supervised by an engineer from the design office.

The investigations were begun with a survey of the capacities of existing inlets, and inquiry, by questionnaire, as to corresponding conditions in 50 large cities in this country and several in Europe. Study of the existing inlets in Los Angeles consisted of turning water from fire hydrants into the gutters on streets with representative slopes and crown section to determine the capacity of the inlets. This preliminary survey confirmed the opinion already reached through casual observation that the existing inlets were inefficient, with capacities too small to fill the storm drains, and that the methods available for computing the correct sizes of inlets were unreliable. Responses to the questionnaires disclosed that: (1) most other cities used even smaller inlets than those in Los Angeles; (2) the design was generally a matter of estimate; and (3) no data existed on the subject of the rational design of inlets for maximum efficiency under variable conditions of street characteristics.

Following this preliminary study, extensive experimental work over a year's period was undertaken with the aid of a model to determine inlet capacities. A miniature half-street, 60 ft. long and 6.75 ft. wide (Fig. 3), was constructed by the city at the hydraulic laboratory of the California Institute of Technology, at Pasadena, with the cooperation of that city and the county of Los Angeles. This model was adjustable for slopes and cross-fall and was fitted with grating and side-opening types of stormwater inlets. The street surface at the lower end consisted of an 8-in. slab of plastic modeling clay, in which were formed the various shapes and conformations of local depressions to determine the shape of greatest inlet efficiency. Flows of water measured by a venturi meter were discharged at the upper end of this model street out of a stilling well.

More than 300 separate runs were made. Observations and data were recorded on the slope, cross-fall and shape of street, size of curb face, location of local depressions, quantity of water, type of inlet and characteristics of flow. The street slope was varied between 0.5 and 9 per cent. The cross-fall was adjusted to correspond to ½- and 1-ft. cross-fall for actual streets.

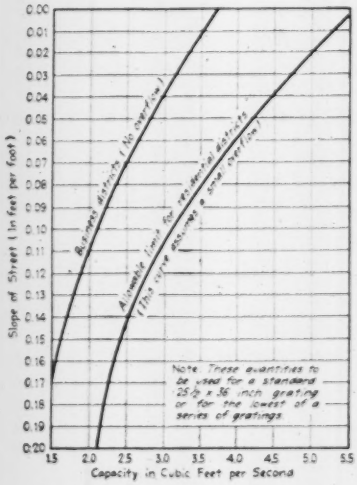

Slope of Street (in feet per foot)
Capacity in Cubic Feet per Second
Note: These quantities to be used for a standard 25½ x 36 inch grating or for the lowest of a series of gratings

Fig. 1—Capacity curve for grating inlets

The investigation naturally was made to conform to limitations imposed by the street and storm-drain designs characteristic of Los Angeles. Storm waters are carried by a separate drain system, and the catchbasin is ordinarily placed 6 to 8 ft. upstream from the produced property line of the intersecting street. Streets generally have an 8-in. curb face, with the gutter depressed 4 in. at the catch basin, rising to a 6-in. curb face at the property line and further to a 4-in. curb face at the center of the return. Cross-gutters and stormwater flow around returns are avoided wherever possible.

Grating Inlets—Grating inlets are more efficient than those of the side-opening type, for they intercept the deepest and swiftest portion of the stream without requiring lateral movement. On steep slopes the flow in the gutter usually is narrow, and there is great variation in the velocity of different parts of the stream. The velocity is a maximum at 1 ft. or so from the curb and decreases to a minimum (practically zero) at the outer edge of the stream. Hence, the larger part of the total flow being within 2 ft. of the curb, it is desirable to use grating inlets on steep slopes. Regardless of the greater cost of this type of inlet, its advantages exceed those of the side-opening type on steep grades (4 per cent or more.)

On flat grades, however, debris such as paper and leaves collects on the gratings, resulting in unsightliness and obstruction to the entry of water. Catchbasins for grating inlets are constructed under the street surface and do not extend back of the curb line. But where obstructions such as fire hydrants, telephone poles, driveways and basement walls extend out under the sidewalk, it is sometimes desirable to use grating inlets even on flat grades, in spite of their tendency to clog.

A standard grating covers an area 25½x36 in. and has ½x3½-in. bars laid parallel to the curb at 1-in. clear spacing. Formerly the bars were laid perpendicular to the curb, but this arrangement has smaller capacity and promotes stoppages by debris. All parts of the grating and frame are galvanized before assembling, for rust prevention and better appearance.

Details of local depressions for grating inlets are shown in Fig. 4. The

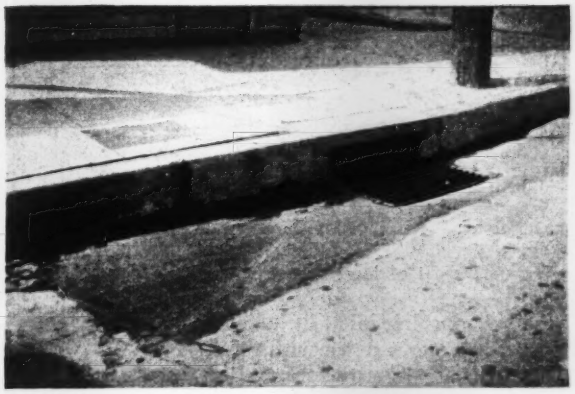


Fig. 2—Typical single-grating inlet
Dimensions and characteristics of the depression are shown in Fig. 4.

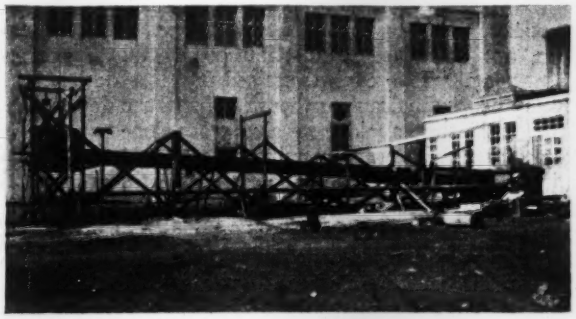


Fig. 3—Street model for experiments
Inlet depressions in modeling clay were tested for measured flows on different grades.

efficiency of the inlets in large measure depends upon the care used in construction in following this design. The local depression for grating inlets is designed to spread the flow evenly over the grating, parallel with the curb; dimensions are dependent on the width of streamflow. For inlets under average conditions (Fig. 4) the depression is 2 in. deep, and the curb face at the grating is 2 in. higer than normal. The "hike-up," or difference in elevation between the inner and outer edge of a grating, is usually 1 in.; longitudinally the grating is on street grade. For very swift flows, on slopes of 10 to 15 per cent, the length of the depression may be increased; for slow flows, on flat slopes (1 per cent or less), the width may be increased. The maximum slope of the local depression surface on sections taken perpendicular to the curb should be 25 per cent. The rise from the lower end of the inlet along the curb should not exceed 10 per cent. These governing slopes, in special cases, may change the standard dimensions shown. Local depressions may be omitted when the quantity of water is less than 1 sec.-ft. and the grade of street less than 2 per cent.

The capacity of a grating inlet, as determined experimentally for average conditions, is shown in Fig. 1. By permitting a slight overflow to pass the intersection (considered permissible in residential districts) the rated capacity of the inlet may be increased by 50 per cent.

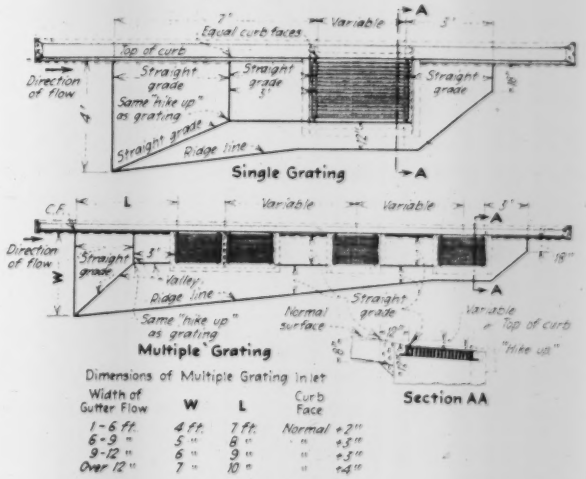
For gutter flows larger than single inlet capacity, a spread grating inlet is used. In this form of inlet it is preferable to separate the gratings by a 15- to 20-ft. spacing to permit the part of the flow not intercepted by the first grating to settle in to the curb before reaching the next opening. This arrangement is superior in efficiency to a single opening of several gratings and may be extended to include as many grating-space units as the flow requires. Fig. 4 indicates the characteristics of this type of inlet for various flows. It is helpful to plot cross-sections and profiles of the pavement in the vicinity of inlet locations to permit study of any sharp changes in grade at the depression that would result in producing poor riding qualities.

In computing capacities for the successive gratings of a series of spread inlets it is assumed that the first grating catches that portion of the gutter flow that it intercepts—approximately the 2 ft. of stream nearest the curb. However, if the stream is swift and deep, a grating length of more than the usual 3 ft. may be required to prevent the surface portion of the stream leaping the upper inlet. Also, an extra grating may be advisable at the upper inlet of a series on streets where stormwater carries considerable leaves and trash.

Side Inlets—As constructed, in lengths of 3½, 7, 10 ft. and units of 7 ft., side inlets cost less than grating inlets but are less efficient length for length. The better appearance is an advantage in addition to a lesser tendency to clog, but they cannot be used at driveways or at locations where there are obstructions back of the curb. Side inlets are particularly inefficient on steep slopes and are not recommended on grades exceeding 4 per cent.

Local depressions in the paving surface, of definite hydraulic properties, increase the efficiency of side inlets. The design of the depression is important in producing characteristics of flow definite enough to permit estimates of capacity. The type of depression adopted, consisting of straight lines and grades, makes for simple construction and improved hydraulic properties. In the accompanying table are shown the capacities for this type of inlet based on the experimental observations. As in the case of grating inlets, the capacities as indicated may be increased materially by allowing slight overflow.

The depression is designed to change the gutter flow from parallel with the curb to diagonal thereto. A 4-in. depression for a normal 8-in. curb face provides a 12-in. curb face at inlet and an 8-in. opening. The initial width of depression is made three-fourths the width of gutter flow under ordinary conditions. The characteristics of this type of inlet (Fig. 5) represent average conditions



Dimensions of Multiple Grating Inlet

Width of Gutter Flow	W	L	Curb Face
1-6 ft.	4 ft.	7 ft.	Normal +2"
6-9 "	5 "	8 "	" +3"
9-12 "	6 "	9 "	" +3"
Over 12 "	7 "	10 "	" +4"

Fig. 4—Details of local depression for grating inlets

but the experiments indicated that the capacity varies considerably with changes in the length and width of depression. An important feature of the hydraulic action caused by the depression is a diagonal wave extending from the upper outer corner to the curb. Maximum inlet capacity occurs when the point of intersection of the diagonal wave at the curb is close to the upper end of the inlet; the average values of length and width shown in Fig. 6 may require modification in special cases.

For large quantities of water it is better to use a long continuous side-opening rather than the spread-inlet design that is recommended for grating inlets. If spread inlets are used, the flow impinges on the curb sections, and the acquired component of the velocity perpendicular to the curb is lost. Acceleration of the flow toward the curb is very slow and when once attained should not be interrupted. However, obstructions back of the curb may prevent use of long side-inlets. Capacity is a function of the length when considering an 8-in. height of

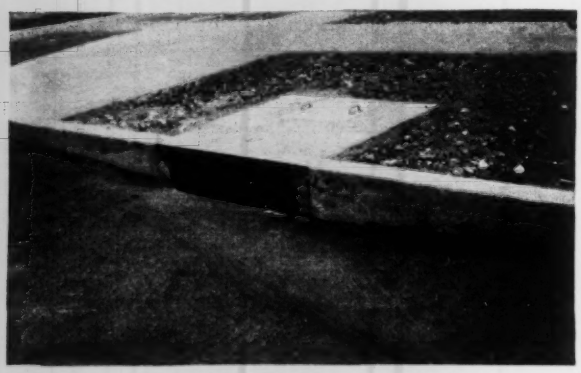


Fig. 5—Typical side-opening inlet

Dimensions of the local depression are shown in Fig. 6.

opening, because, unless there is a large amount of water, the depth of water flowing over the lip of the inlet is only an inch or two.

The disadvantage of grating inlets due to their tendency to clog with trash can be partly overcome by constructing a side-opening inlet about 20 ft. upstream from the grating inlet. As a storm begins, flow in the gutter gradually increases and for a time would be intercepted

CAPACITIES OF SIDE-OPENING INLETS

Slope of Street, Feet per Foot	Length of Inlet	Cubic Feet Per Second — Rise 0 In.	3.5 In.	6 In.	8 In.	12 In.
.005	3.5	0.5	1.8	2.7	3.5	4.9
.005	7.0	1.8	3.4	4.6	5.6	7.5
.005	10.0	3.0	4.7	6.0	7.0	9.0
.005	14.0	4.6	6.4	7.7	8.8	10.9
.005	21.0	7.4	9.4	10.8	11.7	13.9
.005	28.0	10.2	12.1	13.5	14.6	16.8
.01	3.5	0.5	1.7	2.7	3.4	4.8
.01	7.0	2.0	3.6	4.8	5.8	7.6
.01	10.0	3.2	4.9	6.2	7.3	9.3
.01	14.0	4.9	6.8	8.2	9.3	11.5
.01	21.0	7.8	9.8	11.3	12.3	14.5
.01	28.0	10.7	12.7	14.1	15.3	17.5
.02	3.5	0.4	1.5	2.8	4.0	6.4
.02	7.0	1.9	3.0	4.8	6.3	9.5
.02	10.0	3.1	4.4	6.1	7.7	10.9
.02	14.0	4.8	6.2	8.1	9.6	12.8
.02	21.0	7.7	9.4	11.2	12.4	15.1
.02	28.0	10.6	12.6	14.0	15.2	17.4
.04	3.5	0.2	1.3	2.3	3.3	5.3
.04	7.0	1.6	2.5	4.0	5.3	8.0
.04	10.0	2.7	3.6	5.2	6.4	9.1
.04	14.0	4.1	5.1	6.6	7.9	10.7
.04	21.0	6.6	7.7	9.1	10.1	12.5
.04	28.0	9.1	10.3	11.2	12.3	14.3
.06	3.5	0.0	0.9	1.8	2.7	4.5
.06	7.0	0.8	1.7	3.0	4.3	6.9
.06	10.0	1.6	2.4	3.8	5.3	7.9
.06	14.0	2.6	3.4	4.7	6.8	9.4
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.06	28.0	6.2	6.8	7.2	9.6	12.0

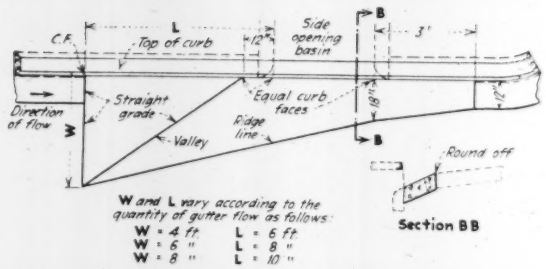

Fig. 6—Details of local depression for side-opening inlet

by the side-opening inlet, including most of the accumulated trash brought down with the first flush of water.

Construction—Contractors and inspectors are inclined to overlook the necessity for precision in laying out and constructing these local depressions. For this reason an engineer from the design office is assigned to check the layout and supervise construction in accordance with instructions covering each detail of the work. These instructions, together with charts, diagrams and standard plans, are available for distribution by the bureau of engineering. The care exercised by the designer to develop proper hydraulic properties for these devices and at the same time avoid excessive cross-slopes at the depressed area, with accompanying objectionable dips in the riding surface, should be supplemented by equal care in construction.

The investigations, experimental work and development of design and construction practice have been under the general and immediate direction of the writers, assisted by E. O. Blades and Carl H. Reeves, of the county surveyor's staff, who also assisted in analyzing the experimental data.

Railway Tie Prospects and Developments

TIE RENEWAL reducing gradually to 143 ties per mile in 1948, on the basis of twenty-year records up to 1928, was predicted by R. D. Garver, U. S. Forest Products Laboratory, at the last annual convention of the National Association of Railroad Tie Producers, at West Baden, Ind. With this figure for renewals and an annual increase of 3,000 miles of track of all kinds, Mr. Garver arrived at a total estimate of 79,000,000 ties for construction and renewals in 1948. More extensive use of anti-checking devices, such as Z-irons, was advocated by S. E. Shoup (assistant engineer, Kansas City Southern Railway) as a means of economy due to increased life; in fact, he considered it desirable to protect every new hardwood tie in this way. These devices were noted also by engineers of the Wabash and Monon lines.

With 98½ per cent of its ties creosoted, the average life of ties on the Chicago, Indianapolis & Louisville Railroad is 23 years, according to A. Anderson, engineer of maintenance-of-way. Many ties laid in 1908 to 1910 are still in use, while the increasing use of tieplates is reducing the number of ties removed on account of rail cutting and spike cutting instead of decay. Renewals on this road have been reduced from 420 per mile in 1909 to 123 in 1929.

That gum ties are more serviceable and reliable than is generally assumed is the experience of the St. Louis-

San Francisco Railway, as related by L. L. White, of the tie and lumber department. It has been widely claimed that this wood should be cut only during the winter, but five years' experience indicates that it can be cut at any time. Two essential features, however, are that the newly cut ties should be shipped promptly to the treating plant and then treated as soon as they are dry, although other kinds of wood may safely be stored for some time before treatment. Gum ties will dry in about half the time required for oak, and the division engineers consider them practically equal to oak in point of service. Ties made from pine trees that have been tapped are as good as those made from untapped trees, according to C. S. Burt (Illinois Central Railroad). Contrary to general opinion, this road has found no reduction in strength or resistance to decay in ties made from tapped pine.

Sludge Disposal at a Sewage Irrigation Farm

By GEORGE A. MITCHELL
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U. S. Department of Agriculture, Vineland, N. J.

HOW TO DEAL with sludge is always a problem in sewage disposal. This article describes the method employed on a sewage farm where the effluent from a settling tank has already been successfully used in crop production.

A sewage-disposal system was established in Vineland, N. J., in 1892-1893. The sewage was piped to sand-filter beds. The effluent from the underdrains was chlorinated during the later years of the use of this system. Since the borough had grown in population and houses had been built near the sewer beds, it was necessary to make a change. In the winter of 1927-1928 a pipe line was laid a distance of about 2½ miles to some extremely poor sandy land that was low enough to make gravity irrigation possible. This sewage system now serves about 8,000 people.

In 1929 the sludge was pumped into the sand basins prepared for it. During the summer, which was very dry, the odor from the sludge caused complaint; and when, during the winter of 1929-1930, the settling tanks were again filled with sludge, the following experiment was tried: The iron pipe line from the sludge pumps to the sludge-drying beds was cut, valves were inserted, and iron pipe was laid to permit pumping the sludge into the terra cotta pipe line that carries the liquid effluent from the tank to the irrigated fields. At first this mixture of sludge and tank effluent was delivered into an open ditch and allowed to flow into the furrows used for irrigating corn in the summer. These furrows had a grade of from 2 to 3.3 ft. in 300 ft., and the sludge-bearing sewage flow was distributed as described in the article "Sewage Farm Displaces Filter Beds at Vineland" (*ENR*, Jan. 9, 1930, p. 65).

In the case of the lighter grade, especially where there was cornstalk litter on the field to check the flow, a large part of the sludge settled all along the furrows, but quite a little of it in all cases was carried to the low places at the ends of the furrows. The best results were secured when the entire stream of about 800 gal. per minute of sludge-bearing sewage was turned on to the upper end of a two-acre plot having a slope of less than 6 in. in 500 ft. and with artificial banks around it. This plot was previously ridged by plowing, the ridges made as close together as possible. The sludge-bearing sewage, being divided into many small streams, flowed slowly a distance of 500 ft., and all the sludge settled in the bottom of the furrows, while the comparatively clear liquid soaked into the earth above it when the bottoms of the furrows were rendered impervious by the coating of sludge. The field was not graded before using, and a few low places received a heavy deposit of sludge. When the ground was plowed, two weeks after the sludge had been applied, slabs of dried sludge projected above the surface where this heavy deposit had occurred. The odor was very slight at any time and not noticeable a month after plowing.

Field ridged to receive sludge-bearing sewage

If a graded field were used, the sludge could be completely plowed under immediately after sludging, by using an evener of such length that the horses could walk on the ridges or in dry furrows. Once the sludge is plowed under, the danger of odor or from flies is done away with. There is no better purifier than surface soil.

In the fall of 1930 the same two acres were again sludged. In the early spring of 1931 an adjoining two acres, which had previously been ridged, was sludged. Soon after the sludging was completed these four acres were graded and ridged for the next application. This was done by two teams and two men, working approximately three days. Field corn was planted in May, 1931, and will be grown without irrigation, since, in the summer months, all the sewage is required on the farm already under cultivation. There is ample land of the desirable degree of flatness to receive the sludge indefinitely from a much larger population than is at present served by the sewer system.

In order to reach the sludge-disposal field the sludge-bearing stream of sewage is carried through more than 2,000 ft. of 15-in. terra cotta pipe. At the end of the operation the manhole at the end of the pipe line had to be cleaned of a deposit that had nearly stopped the flow and had caused overflow at the manhole next above it. From the end of the pipe line the stream flowed in an open ditch a distance of 800 ft. to the two-acre field. The 15-in. pipe was intended to end at the low point of the field, and as an afterthought the pipe was laid to its present terminus, where a manhole opens into a ditch running along the top of a ridge, thus making it possible to irrigate nearly all of the borough-owned land in this vicinity. To do this, the pipe line makes a right-angled turn, and the manhole at the corner projects 4 ft. above the ground surface. When the sewage is flowing the liquid rises nearly to the top of this manhole, keeping the terra cotta pipe under pressure.

Ventilation During Driving of New York's 20-Mile Water Tunnel

Equipment selected after engineering study of cost, efficiency and desired results

By C. F. KELLEY
Patrick McGovern, Inc., New York City
and I. R. LOSS
General Electric Co., Schenectady, N. Y.

THE DESIGN of the ventilating plant for the construction of New York City's water tunnel No. 2, a 20-mile aqueduct being driven between Yonkers and Brooklyn by the board of water supply, was based on an extensive engineering study. The entire tunnel project was let as a single contract totaling nearly $43,000,000. Sixteen headings are being driven from nineteen shafts sunk from 480 to 780 ft. below ground surface. For a small portion of its length the tunnel is roughly 20 ft. in diameter inside of rock line; the remainder is 22 ft. in diameter. To supply an adequate amount of fresh air to each of these shafts and headings efficiently and economically was a considerable problem. Experience to date, with 85 per cent of excavation complete, proves the plant as installed a success.

The state law requires that 100 cu.ft. of fresh air per minute be provided for every man working in the tunnel. With two headings per shaft and 30 to 34 men per heading, the requirement for each shaft was about 7,000 cu.ft. of air per minute. The greatest distance from the surface down the shaft and along the tunnel to a working face is 4,600 ft., nearly a mile. To strike a balance between blower costs, cost of power and the size of pipe to be used for distributing the air was the principal problem involved.

Cost Consideration—The larger the cross-section of pipe used the less is the pressure drop, and consequently less power is required to deliver the air required. On the other hand, the larger pipe is more expensive and costs more to erect. With a total of 18 miles of pipe in use at one time, these items of cost were most important. First costs of blowers for various pressures, together with power costs over the term of years of service, were plotted against the cost of erected pipe. The curve in Fig. 2 shows the pressure drop in pipes of various diameters carrying 3,500 cu.ft. of air per minute, the amount required for one heading. The curve in Fig. 3 shows the kilowatts required to drive 7,000 cu.ft. of air per minute through pipes of various diameters. The curve in Fig. 4 shows the relative cost of the blower and its motor drive in terms of pipe diameters for the required output. From these data, pipe of 14-in. diameter was chosen, costing $1 per running foot installed.

Experiments were started as soon as a shaft was available and were continued for several months. A blower was installed having a capacity of 7,500 cu.ft. per minute of free air at 2½ lb. pressure. The blower was of the centrifugal compressor type designed to convert velocity head into pressure head effectively. It was driven by a

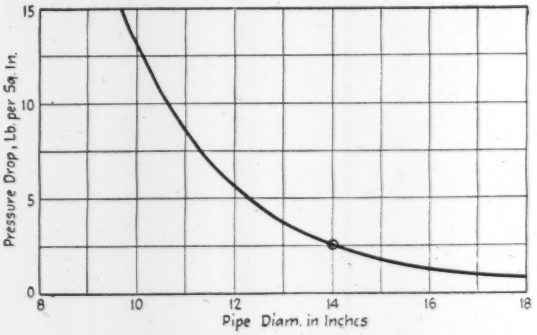


Fig. 2—Curve showing pressure drop in relation to pipe size for 3,500 cu.ft. of air per minute in a 4,600-ft. length of pipe

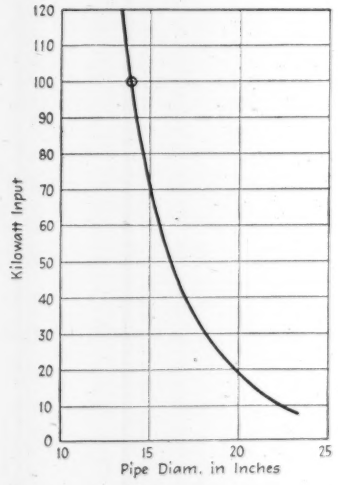


Fig. 3—Kilowatt input per blower for 7,000 cu.ft. per minute total

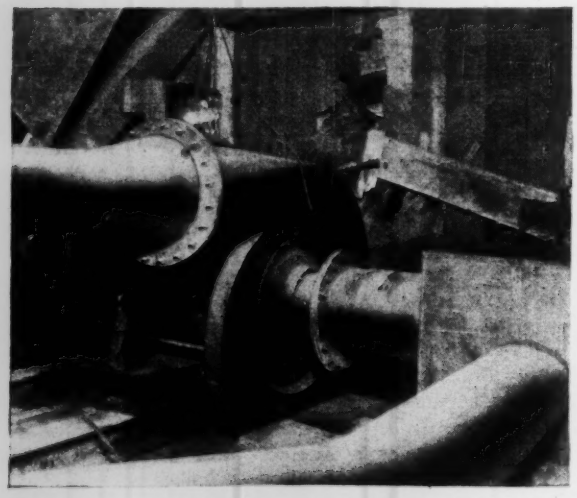


Fig. 1—Centrifugal blower unit installed on New York City aqueduct

Unit is rated at 7,500 cu.ft. of free air per minute under 2½ lb. pressure. It is driven by a 120-hp. direct-connected motor operating at 3,600 r.p.m.

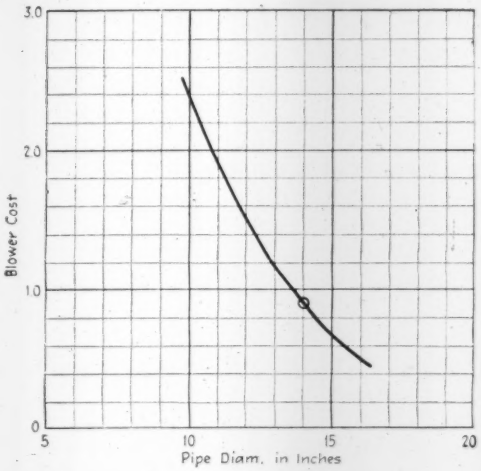


Fig. 4—Blower cost in relation to pipe diameter

direct-connected motor rated 120 hp. at 3,600 r.p.m. Fig. 5 shows the characteristics of the set. It is to be noted that with short lengths of pipe and consequent low pressure drop the motor cannot be overloaded; hence no speed control or manipulation of gates was necessary during the construction of a tunnel section. Piping and gates were installed for optional exhauster or blower operation, and flap valves were placed at the delivery ends of the pipe so that either branch could be shut off. Fig. 7 shows the general arrangement of valves and pipes for blowing and exhausting. In Fig. 1 the installation of a typical unit is shown, and Fig. 6 shows part of the piping and gates for changing from blowing to exhausting.

By experiment it was found that after a blast the tunnel could be cleared in the least time by exhausting the air, smoke, dust and gases for an hour, then reversing the flow for the remainder of the cycle. To remove the gases as soon as possible, the branch to the opposite header was closed during the hour of exhausting. For the detection of leaks in the pipes both flap valves are closed and the unit is operated as an exhauster. The ammeter reading the motor load provides an accurate measure of leakage, for with no leaks the motor load is only the running light load of the unit. The greater the amount of leakage, the higher will be the motor load.

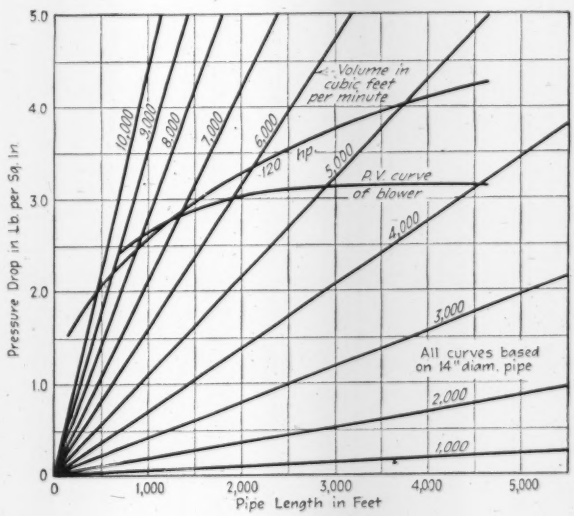


Fig. 5—Characteristics of set
Horsepower curve is maximum value. At the extremes the horsepower is reduced slightly.

As a result of the experimental work and tests, fifteen sets of these direct-motor-driven centrifugal compressors or blowers were installed. The size and weight limits were met easily, since the high speed utilized naturally resulted in a small light-weight motor and blower. Reliability, which was considered of prime importance, was assured by the following facts: the motor is direct-connected; all parts are free-running with ample clearance;

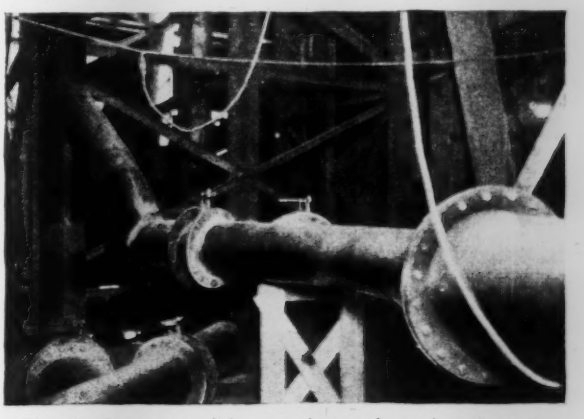


Fig. 6—Crossover piping to change from forced to induced ventilation on 7,500 cu.ft. per minute blower set

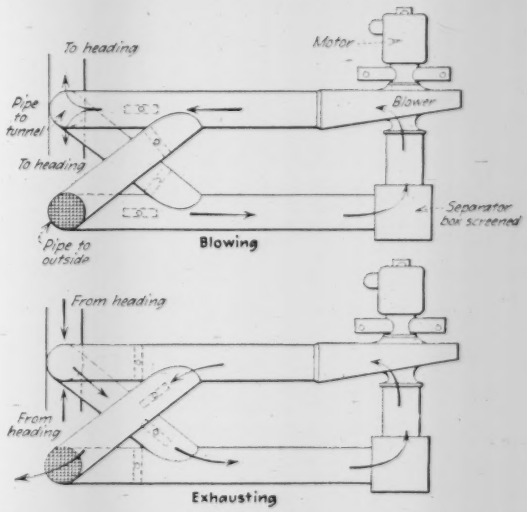


Fig. 7—Arrangement of pipes and gates for reversing air flow

only two bearings are required. The bearings are each supplied with 5 gal. of oil per minute under 3 lb. pressure. Eight gallons of oil is used and is renewed every six months. The combined motor and blower is supported at three points, which made its installation simple and prevents change of alignment through settling of foundations. No mechanical work has been required by any of the fifteen sets since their installation.

Organization—Thaddeus Merriman, chief engineer of the board of water supply, is supervising the construction of the tunnel. C. M. Clark, department engineer, is in charge of field work and is assisted by R. W. Armstrong, senior division engineer. The contractor is Patrick McGovern, Inc. John S. Macdonald, chief engineer, and C. H. Harrington, construction engineer, are in charge for the contractor.

Concrete Lining for Irrigation Canals in Texas

By A. J. MOORE
Assistant Engineer for A. Tamm, Consulting Engineer, Harlingen, Tex.

AT LEAST 250 miles of canals and lateral ditches has been lined with concrete within the past three years in irrigation districts in Hidalgo and Cameron counties, Texas, while about 800 miles are planned for these and other counties of the Lower Rio Grande valley. This practice is proving to be the solution of the valley's greatest problem of seepage prevention and has created new standards of efficiency and economy in water distribution. Typical work with gunite lining in the Progreso district is shown in Fig. 1.

Three distinct types of canal section are in use; the trapezoidal, semi-circular and parabolic, Fig. 2. The first has been used exclusively on the Goodwin tract,

Fig. 1—Gunite lining of irrigation canal
Section in foreground is finished and filled; note burlap covering. Next section is ready for lining.

where 29 miles of hand lining has been completed. In fact, the trapezoidal section has been the rule in hand lining until the recent use of circular bottom with tangents at either side in the Engelman district, where all lining is hand placed (Fig. 3). The circular section, which has an arc of about 145 deg. with short tangents at the top, has been used by three large districts and is practically limited to gunite lining. The parabolic section, used entirely by three districts, has advantages in that it is easily cleaned when required, is adapted to either gunite or hand lining and can be used without danger of caving in extremely light soil, as the slopes vary from 0.6 on 1 to 1 on 1. The greatest advantage in the circular section is its hydraulic efficiency.

In designing for carrying capacity the general practice has been to allow 1 sec.-ft. per 20 acres or less in 40- to 100-acre tracts, 1 sec.-ft. per 50 acres in tracts of 400 to 1,000 acres, and a minimum of 1 sec.-ft. per 100 or 125 acres in tracts of several thousand acres. These figures are subject to variations, as the class of agricultural product is the most important factor in establishing the duty of water over a given tract of land. The freeboard in lined canals is usually 0.5 ft., but in small ditches protected by spillovers 0.3 ft. is adequate. Above the concrete lining the levee is usually carried 0.5 ft. high with an inside slope of 1 on 1½. At Progreso slopes in grade varied from 1 in 2,000 to 1 in 4,000. In calculating capacity *n* in Kutter's formula was taken as 0.015, and velocity ranged from 1½ to 2¾ ft. per second. It was found that river silt was deposited as readily at 2½ ft. per second as at lower velocities.

In districts where the circular section was used the cost of fine trimming was reduced by swinging hoes in the required arc from a rigid water-pipe shaft laid along

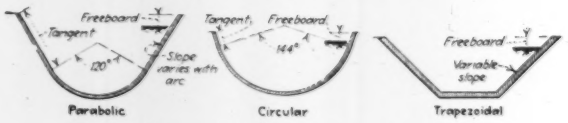


Fig. 2—Typical canal sections

the center line of the ditch. In old canals of the Progreso district fine trimming was done by hand labor with shovels, mattocks and hoes. Sections were first cut to templet at intervals of 10 to 12 ft. A wire stretched along each side of the ditch gave top grade and alignment. Gunite was shot against the prepared bank at a pressure of 30 to 40 lb. per square inch, using a 1:4 mix of cement and sand, measured loose. After the lining had been placed all rebound material was removed and the surface swept with a stiff broom, no troweling being done. Then the surface was covered with burlap sacks, which were kept wet until the canal could be filled with water, as shown in Fig. 1.

All poured structures in this district, such as the larger checks and road culverts, were built in advance of the lining. Check walls and head walls were 6 in. thick, reinforced. Wing walls were built only on the downstream side of the check structures. A cheap and efficient type of check is shown in Fig. 4. All field turnouts and smaller lateral headgates and checks were gunited in

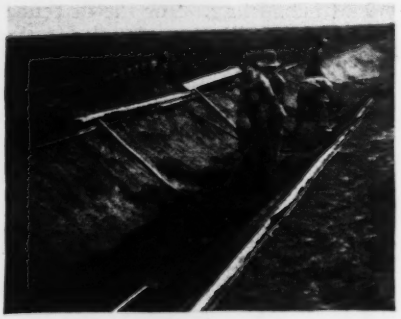


Fig. 3—Dressing canal section to templets

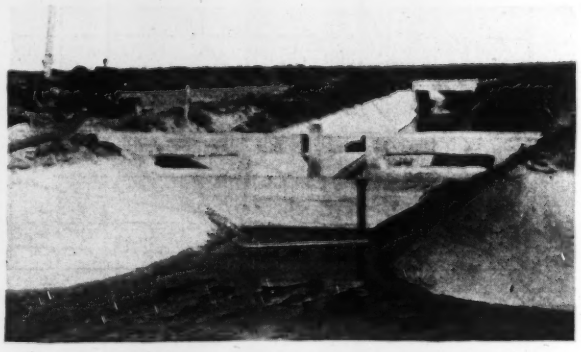


Fig. 4—Concrete check and lateral ditch

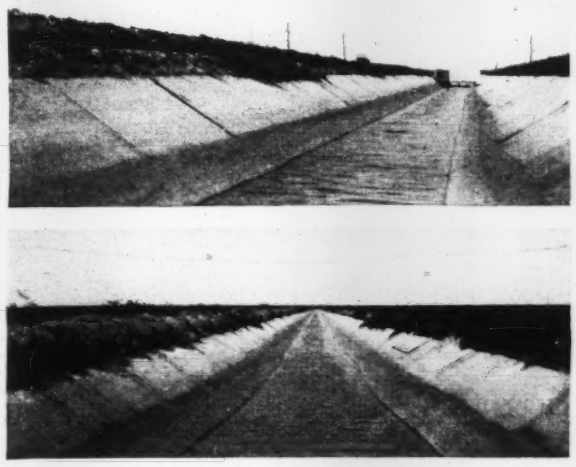


Fig. 5—Hand-laid concrete lining
Above, with expansion joints. Below, without expansion joints.

place as the ditch was lined. The gate was first seated in gunite, then a 5-in. reinforced headwall was built up behind it, using a single wall of shiplap as a form.

Practically all gunite lining is 1 in. thick, with a mix of 1:4 or 1:4½ of cement and well-graded sand. Hand lining has been mostly 1½ and 1¾ in. thick with a 1:2:4 mix. Steel wire-mesh reinforcement is used on the larger canals and most of the smaller ditches. The Mission and LaFeria districts have used both troweled and broomed finish on 35 and 39 miles of gunite lining. Hand-laid concrete has all been trowel-finished. Expansion joints have not been placed in gunite lining, but hand lining has been built with and without expansion joints, as shown for the Goodwin tract in Fig. 5.

Maintenance on lined canals in the Progreso district has been limited to tarring the wider contraction cracks, which are infrequent. No seepage through cracks has been found that entirely penetrated the dirt levee. In this district, river silt deposit has been eliminated (except in one canal) by a 20-acre settling basin between the river pumps and main canal. In the canal fed directly from the river, cleaning is done by hand through the first ¼ mile every few months and throughout the entire ditch at least once a year. Water velocity in this ditch is about 2.5 ft. per second.

Tests for the value of *n* in Kutter's formula were made by Fred C. Scobey, senior irrigation engineer, U. S. Department of Agriculture, in a section of the main canal of the Progreso district. With the canal flowing about two-thirds full *n* was found to be slightly more than 0.014. In the Mission district it was computed as approximately 0.012. Both tests were made in gunite-lined canals, the former having a "broomed" finish, while the latter was finished by screeding with a knife-edge scraper. Mr. Scobey believes that slight silt deposits will equalize at least partly the initial differences in surface smoothness.

Gunite lining was begun in the Mercedes district early in 1930, and 72 miles was completed, while plans call for 80 additional miles. With this amount of lining R. S. Fessenden, manager of the district, was able to show in his annual report a saving in fuel costs at the river pumps of $5,929 over 1929. The pumpage was 84,984 acre-ft., or $6,755 less than in 1929. As an average, the cost of lining has been 15 and 16c. per square foot, including preparation of old canal, building structures, installing new field gates and all other incidental expenses. This brings the cost per mile to approximately $6,500 for a ditch of average size or 15- to 20-sec.-ft. capacity.

Engineers—Plans and specifications for canal lining in the Progreso, Edinburg and Engelman districts were prepared by A. Tamm, civil engineer, Harlingen, Tex., who was also in charge of construction work in these and other districts. Card & Parks, McAllen, Tex., are engineers of design and construction on the Goodwin tract; E. P. Congden is engineer in charge of the Mission district; R. S. Fessenden is in charge of the Mercedes district; and A. W. Amthor of the LaFeria district.

Steel Bracing in Concrete Viaduct for Longitudinal Forces

Steep grade and foundation conditions require unusual bracing to resist stresses caused by passing trains

A REINFORCED-CONCRETE viaduct having steel diagonal bracing between the bents in alternate spans is a curious and conspicuous feature of the complicated railway grade separation at Canal and 16th Streets, Chicago. It is to carry the joint tracks of the Burlington and the Chicago & Northwestern railways, which extend east to connect with the St. Charles Air Line at its bridge over the Chicago River.

This viaduct, 1,000 ft. long, shown in Figs. 2 and 3, is

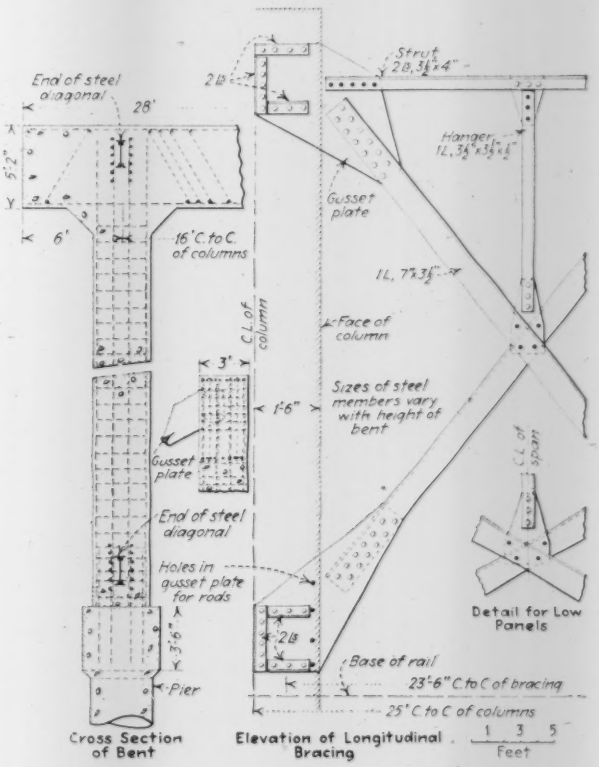


Fig. 1—Steel bracing joined to concrete column through embedded gusset plates with angle-frame anchors

Fig. 2—Concrete viaduct with steel longitudinal bracing

Structure carries tracks of Burlington and C. & N. W. railways in Chicago. Note double set of bracing in end bay at right. The last bent supports the span over Canal St. bridge. Burlington Railroad main line in foreground.

so located as to cross Canal St. at a point where the street is raised to span the main tracks of the Burlington Railroad, which are at ground level. To reach the necessary elevation for a bridge over the street involved a grade of 1.44 per cent, while the height to rail level ranges from 15 ft. at the lower end to 35 ft. at the west side of Canal St. With such a grade, trains exert a considerable longitudinal effort in the downhill direction, especially when applying the brakes or starting on the grade. The two-post bents are founded on cylinder piers sunk to rock at a depth of about 70 ft., but the ground in which these piers stand is too soft to afford any material resistance against their longitudinal bending. Close clearance for tracks, streets and property lines restricted the design. To meet these conditions the steel longitudinal bracing was introduced, making a combination structure of very unusual character.

Spans mainly 25 ft. c. to c. have bents composed of two posts and a heavy cap or cross-girder. In each braced bay there are two sets of steel bracing, Fig. 3, consisting of two diagonal angles 7x3 in. and up to $\frac{3}{4}$ in. thick, riveted to top and bottom gusset plates that are embedded in the concrete bents. A strut of two angles 3½x4 in. connects the top gussets to resist longitudinal thrust and is kept from buckling by a vertical hanger angle at midspan, its lower end being attached to the intersection of the diagonals. On each gusset plate is a frame composed of angles that engage the concrete in the columns and thus form anchors for vertical and horizontal components of stress in the bracing. The vertical column bars are tied together with hooked bars to distribute bracing stresses over the entire area of the column. Holes in the gusset plates admit the horizontal bars or hoops.

Upon the caps of the bents are the deck slabs, which are poured in place and rest on 1/32-in. zinc plates laid on top of the cross-girders. The slabs are in one-span lengths, separated by expansion joints over alternate bents and by paper joints over the intermediate bents. They have paneled exterior surfaces and low curb walls to retain the stone ballast. On some spans the curb is extended to form a cantilever platform as a refuge for trackmen. An iron hand-railing is provided on each side of the structure.

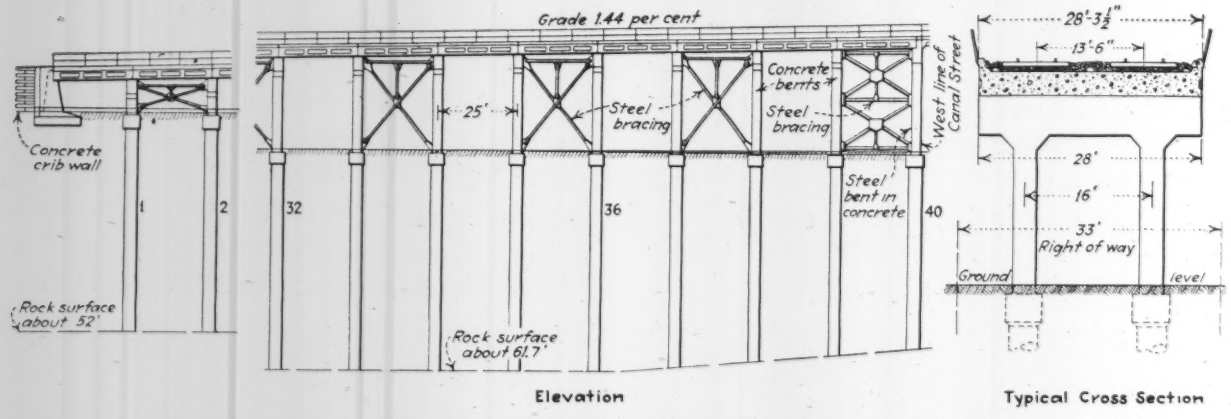


Fig. 3—Steep grade and lack of lateral soil support for pile foundations dictated use of steel bracing in concrete viaduct

As clearance limits at Canal St. prevented the construction of an abutment to carry the railway bridge over the street, this bridge is carried on a tall steel bent which is anchored back to the adjacent concrete bent of the viaduct by a double set of steel bracing in order to form a braced tower, as shown in Figs. 2 and 3. This steel bent is incased in concrete.

Engineers

The grade-separation project was designed and carried out under a special engineering organization of the Chicago, Burlington & Quincy Railroad, headed by G. A. Wiegel, special engineer of the railroad, with L. W. Skov, of the same road, as engineer of design.

Welded Erection Seat Eliminates Field Bolts in Welded Steel Frame

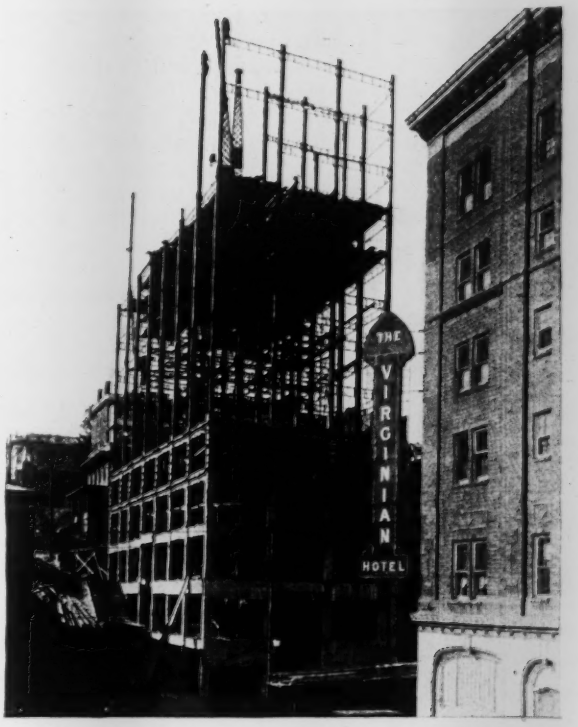
By A. R. ELLIS
Vice-President, Pittsburgh Testing Laboratory, Pittsburgh, Pa.

DEVELOPMENT of a special erection seat, shop-welded to columns and beams, eliminated the necessity for using any field bolts during the erection of the arc-welded frame of the eighteen-story steel-and-concrete Allied Arts Building in Lynchburg, Va., and effected a considerable saving in the final cost of the structure. The majority of past welded building designs have required the punching of holes in both columns and beams to take care of bolted connections used for erection purposes and to hold together joints that are to be welded. The use of the welded erection seat made punching unnecessary, eliminating the labor and cost of moving heavy sections to and from the punching machines, and in fact made it unnecessary to pass the steel through a fabricating shop except for cutting to length and milling the columns. The laying out and shop welding was done alongside a shipping track in a welding shop equipped with an overhead crane.

The Allied Arts Building is a reinforced-concrete structure with steel-core columns and with a slab-and-girder floor system incorporating structural-steel reinforcing in the girders to serve the dual purpose of staying the steel column cores during erection and of providing a support for the floor forms. This structural-steel reinforcing was of two types—channels corresponding to the so-called "system M" construction, and trusses known as "system S" construction. The composite S-beams were used in all wind bents, and their reinforcing consisted of an angle at the top, an angle at the bottom and a bar in the bottom bent up at the quarter points and connected to the top angle at each end; the top and bottom angles were joined by narrow vertical shear plates. This type of construction in a riveted instead of a welded design was described in *Engineering News-Record*, May 12, 1927, p. 771. The panels throughout the building were about 14 ft. square and the latticed S-beams, as a rule, were a depth corresponding to practically $\frac{3}{4}$ in. of depth to 1 ft. of span. The spandrel beams, however, were varied in depth, projecting above the floor slabs about 1 ft., so as to get the best design conditions for the bracing of the building and to hide any beam on the inside of the building that projected out from the wall above the window heads. Both two-way and one-way tile floor slabs were used.

In planning the building, welding of the steelwork was recognized as desirable to avoid annoyance to the guests of the Virginia Hotel directly across the street, and it was adopted when studies showed it to be more economical. The price bid for the steelwork welded was $1,975 less than the estimate for riveted construction of the same type. Inasmuch as there was 316 tons of steel in the building, a saving of $6.25 per ton of steel was realized. The S-beam type of construction effected a total saving for the owner of approximately $15,000 over an original layout incorporating standard structural-steel beams with stone concrete incasement and stone concrete slabs with rod reinforcement.

The erection seat is the outstanding feature of the design. It was shop-welded to all columns for beam connections and to all beams for other beam connections. The beams are supported in the erection seat by angles or split I-beam stubs. The latter are used at connections developing considerable wind moment.



Welded connections used throughout on composite steel-and-concrete frame of Allied Arts Building, Lynchburg, Va.

The erection seat is shown in the accompanying photograph. Being beveled on the inside and toward the column or beam to which it is connected, the weight of the floor member conecting at this point forces the connection angle against the member to which it is to be welded, and the sharp edge of the bevel prevents displacing of the beam by any ordinary blow that it may receive during erection.

At column splices, angles shop-welded to the webs of the columns were used to hold the columns in line until the flange splice plates could be welded. These angles were placed to clear the milled edge of the columns and so do not take bearing on one another. Holes were punched in the outstanding legs of these angles, although they could as well have been burned in. This is the only place in the building where bolts were used, and drift pins would have functioned as well. Some flexible connection, however, was necessary in order that the columns could be kept in line while they were being tilted to permit the insertion of the beam connection angles into the erection seats. The columns were tilted by subjecting them to a pull at the top from the falls line of the erecting derrick. The column sections are three stories tall, and three floor beams were dropped into place simultaneously while the columns were tilted.

An interesting example of the strength of this construction was brought about by an accident. The 75-ft. steel boom of the erection derrick fell and struck one of the floor beams adjacent to the column connection before the connection was welded. The only damage was to the flange of the S-beam, and this beam was straightened out and used. The welded-on seat was bent

downward but not broken away from the column. It was cut off with a torch, and a new one was welded in place.

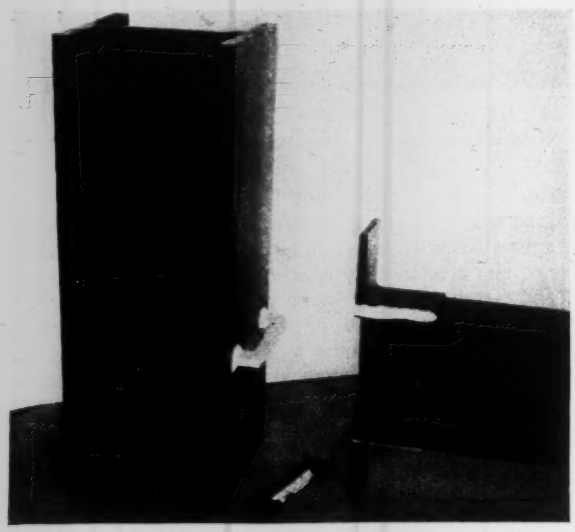
Qualification tests for the welders, both in the shop and in the field, were made periodically. The average shearing strength per inch of weld on both shop and field test welds developed approximately 2½ times that required.

Steel was inspected in the rolling mill for quality, surface and size. The welding rods were examined for quality, and both the shop and field welding were inspected and checked for length of weld, position, size of bead and penetration. All welds were tested throughout their entire length by the sound method, a hammer and a stethoscope being used.

The following details show the amount of welding for the various members in both the shop and the field work:

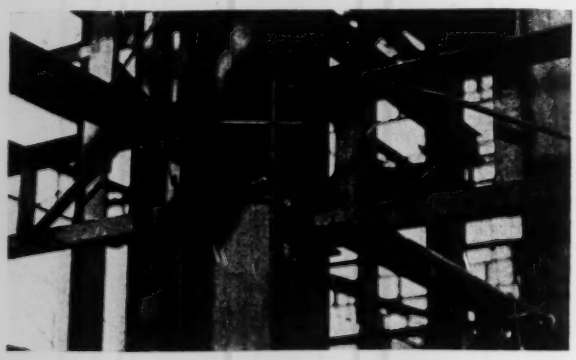
	Shop Welding	Field Welding
S-beams	36 ft. ¼ in. per ton 19 ft. ⅜ in. per ton 25 ft. ¼ in. per ton 18 ft. ¼ in. per ton	46 ft. ¼ in. per ton
Columns	17 ft. ¼ in. per ton	6.4 ft. ¼ in. per ton

Personnel—The designing engineer, who also designed the erection seat, was Van Rensselaer P. Saxe, of Baltimore, Md. The architects were Johnson & Brannan of Lynchburg, Va. The general contractor was C. W. Hancock & Sons, Lynchburg, Va. The steel was fabricated in the shop of the Morris-Wheeler Co., of Philadelphia, by the King Welding Co., of Lancaster, Pa. The inspection and testing were performed by the Pittsburgh Testing Laboratory.



Welded erection seat eliminated all necessity for shop-punching and use of field erection bolts

Flame-cut I-beam stubs were substituted for the connection angles where rigidity and extra shear resistance were required.



Typical beam-to-column connection, Allied Arts Building

Note use of I-beam stub connections on S-beam reinforcement. Channels were used as reinforcement lengthwise of building.

Blocking the Spillways of Dams Is Dangerous!

Attempts to conserve water by flashboards after last year's drought experience are creating hazards

By HOWARD K. BELL

Consulting Engineer, Lexington, Ky.

MANY OWNERS of small water supplies are undertaking to provide for continued or future drought conditions by raising the spillway level of storage dams. This practice is creating serious hazards and calls for prompt attention by those responsible for public security.

Since the drought of the past year, owners of at least three dams in this vicinity have increased their water storage by raising the spillways—in two cases by flashboards, and in the other by raising the concrete spillway wall itself. At one dam the water has been raised almost to the top of the earth dam; in another the flashboards occupy two-fifths of the spillway height.

Such occurrences show how quickly some men responsible for water-storage works forget the flood hazard. In the central Kentucky district, which was one of those most affected by the 1930 drought, the year 1928 was one of unprecedented local floods, recurrence of which might prove disastrous to many of the dams whose spillways have been restricted. Less than three years ago a rainfall of nearly 6 in. occurred within a period of 24 hours in this city and immediate vicinity, when streams and lakes already were full and the soil was saturated. Such conditions, which may be approximated again within a few seasons, would spell disaster to the dams with partly closed spillways.

Flashboards have been placed in one spillway that is 5 ft. deep and 140 ft. long. The dam is an earthfill with concrete corewall, which impounds the water from 12 square miles of drainage area. When this dam was first completed in 1915 it experienced a flood of 3 ft. depth on the spillway. In 1922 a cloudburst in the immediate vicinity, but extending in its greatest intensity over about one-third of the watershed, entirely filled this spillway and overflowed the dam at several points where settlement had taken place. Some washing out of the embankment occurred at that time, but the damage was easily repaired. With the closing of two-fifths of the spillway depth, however, there is grave danger that the entire dam may go out.

Flashboards in this and in other cases, readily removed in dry weather, cannot be removed during a flood. If we know when floods are likely to come and whether a dry or wet summer season may be expected, the flashboards are of value. But the risk of cloudbursts is so great that such obstructions should be made automatic, or else the embankment or corewall should be raised. Even this may not be final protection, for in one case where an extension was constructed a few years ago the extra height has since been utilized by further closing of the spillway.

World's Longest Double-Track Tunnel Pierces Italian Apennines

Lined bore 29 ft. wide 11½ miles long with mid-tunnel siding enlargement to 56 ft. constructed through loose rock, developing water, gas and squeezing pressures

A TWO-TRACK TUNNEL 11½ miles long now carries the Florence-Bologna line of the Italian state railways across the Apennine Mountains at an elevation nearly 1,000 ft. lower than that of the old crossings. This is the longest double-track tunnel in the world, its length exceeding that of the St. Gothard tunnel by nearly 2¼ miles. The Apennine tunnel also, in contrast to the St. Gothard and other Alpine tunnels through solid rock, is virtually a soft-ground tunnel. The soft schist, shale and clay formations penetrated had to be heavily timbered, and in places the squeezing pressures, explosive gases and large volumes of water under great heads added to the difficulties of construction.

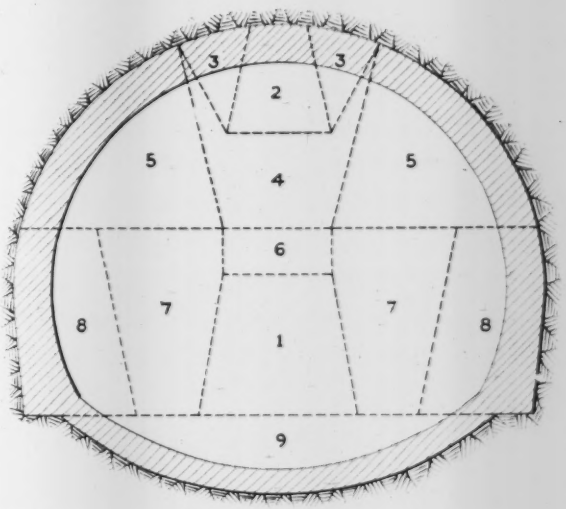


Fig. 1—Sequence of excavating and timbering operations in normal ground

Tunnel Structure

The tunnel has a horseshoe section about 20 ft. wide at the springing lines. At the middle, for a length of 4,000 ft., the section is widened to about 56 ft. to provide for a four-track passing and switching yard. The lining is brick or stone masonry, stone being used where the pressures were greatest. The masonry varies from 1.8 to 3.5 ft. in thickness and was laid in cement close against the rock, no loose packing being permitted. The total excavation was about 1,950,000 cu.yd., and the volume of lining was 520,000 cu.yd.

Construction Methods

The tunnel was driven from the portals and from center shafts giving a heading each way from the middle. The shafts were about 410 ft. apart at about the middle of the center enlarged section. They were sunk on an incline of 50 per cent and were about 843 ft. deep. The enlarged middle section provided extra room for shaft-bottom equipment and operations. Two railway lines were constructed, one 13½ miles long and the other 17 miles long, to serve the portal operations. The shafts were served by an aerial tramway 5.6 miles long.

Excavation and Timbering—In general, the excavation was begun with a center bottom drift followed by a crown heading. At intervals of about 20 ft. the drift and heading were connected by shafts about 3 ft. square. The enlargement from the drift and heading varied in sequence of cuts and in the type of timbering with the conditions of the ground.

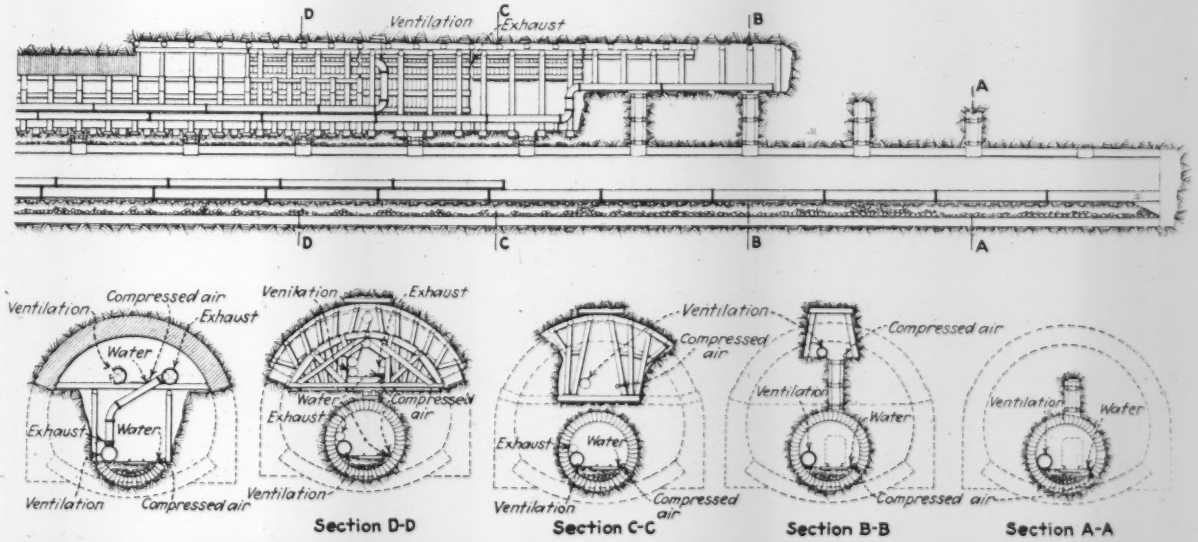


Fig. 2—Sequence of excavation and timbering operations in squeezing ground

In the south half of the tunnel, where the ground was reasonably favorable, the procedure was as shown by Fig. 1. Briefly, the crown heading is widened by two small side cuts and then deepened by a bottom cut to about springing-line level. The heading is then widened to full-arch span, and the roof arch is built with its feet supported by the unexcavated bench. A bottom cut then opens up the drift, which is widened, and posts are inserted to support the roof arch as it is undermined. The haunch lining is then completed and the invert constructed. The type and sequence of timbering for the various operations are substantially those shown by Fig. 2 for the north half of the tunnel, except for the circular drift.

The north half of the tunnel was opened up under far more difficult conditions. Not only had large inflows of gas and water to be handled, as described later, but the ground developed enormous pressures. As shown by Fig. 2, the sequence of excavation was nearly the same as for the south half. To meet the ground pressure, however, the bottom drift was made circular and lined with vousoir-shaped wood blocks 20 in. thick, leaving an inside diameter of about 11½ ft. The subsequent processes of timbering and widening are made clear by

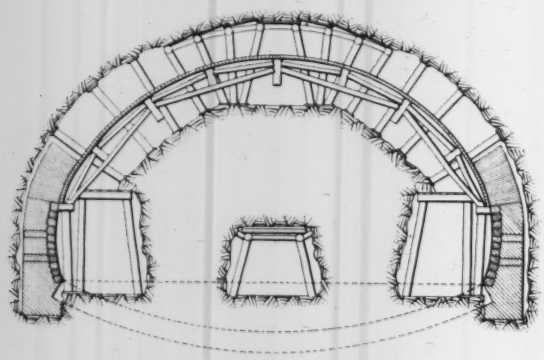


Fig. 3—Method of opening and lining 56-ft. section

Fig. 2. About the only difference from the procedure at the south half was that the full section work was kept very close, sometimes within 300 ft. of the headings.

Fig. 3 shows the order of procedure in constructing the four-track section. Here the main change was the driviing of bottom side drifts and building the lining from the invert upward. The great section is notable, but otherwise the work presented only ordinary characteristics.

Water and Gas Troubles—In the north half of the tunnel inflammable gas of a methane character gave considerable trouble. Where most prevalent the ventilating system (Fig. 2) was not capable of removing it, and it had to be burned off about every two hours by electric ignition. To guard against fire from the gas, steel timbering was used at the most dangerous points, and a water pressure line was carried to the workings.

Trouble from water occurred chiefly in a short section of 480 ft., but there was inflow throughout the whole north half of the tunnel. At the worst period the volume pumped up the center shafts, a height of 660 ft., was 300 gal. per second. This required 6,600 hp. of electric pumps. At points there were jets flowing 45 to 50 gal. a second under a pressure of thirteen atmospheres. To control these jets and break them up for ordinary drainage, use was made of the devices shown by Fig. 4. In this section the advance was only 3½ ft. a day.

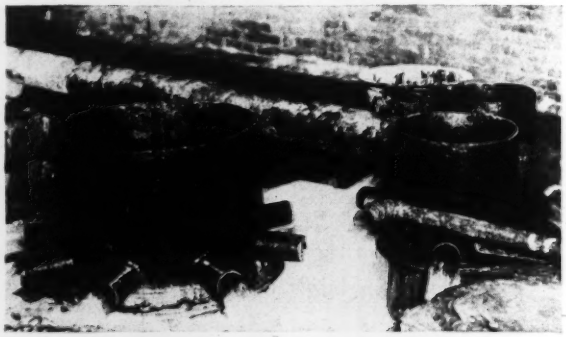


Fig. 4—Device for stilling flow of water jets

Ventilation—The gas and the long headings made extensive artificial ventilation necessary. At each portal there were two ventilators having capacities of 24 cu.m. per second at 10 in. of water. One of these was a spare machine. Two secondary ventilators were installed near the face. These drew air from the 6½-sq.m. main duct. An exhaust fan took the gas from the headings. At the shafts there were two 20-cu.m. per second fans feeding to main air ducts in the tunnel. Fig. 2 shows the arrangement of the ventilating pipes in the tunnel. Altogether, the ventilation of the tunnel required about 6,500,000 cu.m. of air per day, or 25 cu.m. per second at the headings.

Other Tunnel Services—The tunnel was lighted throughout by electricity. Compressed-air locomotives did the hauling, and air drills were used. A pressure pipe line carried water to the workings. For these and other services the power consumption averaged 56 kw.-hr. per cubic meter excavated.

Cost and Progress

The tunnel was begun in 1923 and completed in 1928, at a cost of $24,735,000. The average working force was 1,300 men in the tunnel and 650 men outside. The average progress was 9 ft. a day on the south half and 7½ ft. on the north half. The tunnel was constructed by the Italian ministry of public works and turned over to the Italian state railways.

Steel-Casting Capacity Reduced

In the May issue of *The Steel Founder*, publication of the Steel Founders Society of America, Inc., it is pointed out that the capacity for producing steel castings in the United States was reduced about ¾ per cent in 1930 over 1929, or a net reduction of 14,910 tons. This, it is emphasized, is a satisfactory situation inasmuch as the steel-castings industry has only been able to operate between 55 and 60 per cent of its capacity during the past ten years. The following table shows the production situation in the steel-castings industry:

CAPACITY FOR MAKING STEEL CASTINGS

	Dec. 31, 1930	Dec. 31, 1929	Percentage of Increase	Change, December
Basic open-hearth	811,310	806,010	0.66	.....
Acid open-hearth	691,290	714,690	....	3.27
Total open-hearth	1,502,600	1,520,700	....	1.19
Bessemer	37,875	46,935	....	19.30
Electric	540,615	528,415	2.31	.....
Crucible	1,995	1,945	2.57	.....
Total	2,083,085	2,097,995	....	0.71

Excavations in Public Highways

Liabilities of Contractors and Officials

An interpretation of the rights and responsibilities of public authorities, private corporations and contractors in excavating along roads and streets under both contract and day-labor work

By NATHAN YOUNG
Member New York Bar

IN AN ARTICLE appearing in *Engineering News-Record*, April 10, 1930, p. 615, Mr. Young interpreted the rights and liabilities of contractors and owners in excavations affecting adjoining properties. In the following he discusses the responsibilities of all concerned in relation to excavations along public highways, an entirely different aspect because of the fact municipalities are responsible for the safety of the public traveling the highways. —EDITOR.

MOST public improvements, such as streets, subways, sewers, water supply and public buildings, take their inception in an excavation. Often these excavations are in the line of public travel or adjacent to private lands and buildings, and are frequently the source of personal injuries and property damage and consequent litigation.

Except in instances when the employees of the municipality themselves perform the work, excavations are either contracted for or permitted by the municipal corporation under the supervision of municipal engineers upon whose alertness and knowledge of the rights and liabilities of the municipality may depend the outcome of litigation involving large sums of money. What are these rights and liabilities?

In the interest of public welfare the municipal corporation is endowed with the power and authority to prohibit excavations in streets without proper permission, to make uniform and reasonable regulations governing such excavations and prescribing safe restrictions relating to them. The municipal corporation may take legal steps to enjoin work in public highways within its jurisdiction undertaken without proper permission. It may insist that proper safeguards be placed around excavations made by persons who have secured the necessary permission. It may specify the manner of making such excavations and supervise the same. It may generally regulate the use by the public of the highways.

Municipal Rights in Streets

In the very early case of the city of Philadelphia against the Western Union Telegraph Co., decided in 1876, the court, in discussing the rights of the municipal corporation with respect to streets, said:

> We are also of opinion that a grant to a private corporation to use the streets of this city for any purpose is subject to the implied condition that such corporation shall obey and conform to all lawful and reasonable ordinances which the city has enacted to control, restrict, limit or regulate the use so granted; and that in any conflict which may arise between the city and such private corporation, such ordinances are to be construed as liberally and favorably as possible for the city, in furtherance of the rights of the public and in restraint of the encroachments upon their rights, with which they are constantly threatened by private corporations.

In the New York case of the village of Haverstraw vs. Eckerson, decided in 1908, the court went even a step farther and at the instance of the village of Haverstraw enjoined an owner from proceeding with an excavation wholly on his own land because his method of doing so endangered the lateral support of the street and threatened its subsidence.

These substantial rights of the municipality are accompanied by serious responsibilities. Most excavations for public works are made in public highways. The municipal corporation has control over these highways, and this privilege carries with it the duty to exercise reasonable care to maintain the highways in a safe condition for the traveling public.

When the municipality itself undertakes to make an excavation in the highway and by reason of the negligent manner in which this is done an injury is sustained or property is damaged, the municipality is, of course, liable. A more serious question, however, arises when the excavation is made by a contractor under the terms of a contract with the municipality or by a private individual or a semi-public corporation, as for instance a gas or telephone company or other public utility known as a licensee which has secured the necessary permission of the municipality.

The liability of the municipality in the case of an excavation by a contractor is different from that in the case of an excavation by a licensee. Ordinarily, where an individual or corporation undertakes a construction operation, employs a contractor to do the work in accordance with certain plans and specifications, permits the contractor to perform the work without interference or specific direction, and personal injury or property damage results from negligence in the performance of the work, the liability rests solely upon the contractor (known in legal terminology as the independent contractor). This rule applies generally to excavations performed under a contract with a municipal corporation. Excavations in public highways, however, are an important exception.

The municipal corporation, as stated above, is charged with the duty to exercise reasonable care to maintain the highways in a safe condition for the traveler. When it undertakes to construct a public improvement in the highway and employs an independent contractor to do the work, it cannot thereby evade its responsibilities to the public. If a traveler on a public highway, therefore, should be injured by reason of negligence in making an excavation, he may look to the municipality for compensation for his injuries, even though the excavation should be made by a contractor.

In the Indiana case of Julius Keller Construction Co. et al against Herkless et al., decided in 1915, the court in a very lucid opinion states:

> A city may be liable also for the acts and omissions of an independent contractor in situations involving certain duties resting primarily and absolutely on the city, the per-

formance of which the city may not delegate to another to its own exemption. Thus municipalities are given authority over public streets within their respective jurisdictions. From such authority, arises a duty to exercise reasonable care to keep such streets in condition reasonably safe for public tavel.

If the municipality orders or authorizes the construction of a work such as a sewer on, along, or across a public street, the nature of the enterprise being such as to require that excavations be dug in the street or other dangerous obstructions placed therein, the necessary effect of which is to render the street unsafe for public travel, it is the duty of the municipality to take reasonable precautions to see that such obstructions are safeguarded by the placing of lights at night, the erection of barriers, or other proper means to that end. Such duty rests absolutely on the municipality and may not be delegated. If the municipality commits the performance of the work to an independent contractor and through the neglect of the contractor in failing to safeguard the obstructions a traveler on the street is injured, the municipality as well as the contractor is liable. . . . The municipality is liable because it, in committing to the contractor duties which are non-delegable, makes him to that extent its agent, for whose negligence it is liable.

Negligence of the contractor is a necessary fact to establish liability on the part of the municipal corporatioin. Injury alone is not sufficient; it must be caused by the contractor's carelessness. What constitutes negligence has been a subject of discussion in numerous cases and often depends upon the particular circumstances involved.

The care of the contractor must extend not only to the excavation itself but also to temporary bridges erected over such excavation, to temporary roadways, and to the piling of materials in the road. If a temporary timber bridge, for example, should be carelessly built and collapse under the weight of pedestrians, the municipal corporation would necessarily become liable for injuries sustained.

The care that the law compels the municipality to exercise in maintaining the highways, even in the case of work performed therein by independent contractors, is intended only for the protection of the traveler. The rule does not apply in the same manner for the protection of owners of property adjoining public highways. In the case of adjoining owners the liability of the municipality is similar to that of the private owner on whose land an excavation is made (*Engineering News-Record*, April 10, 1930, p. 615), except when the work is inherently dangerous. Then the municipality becomes liable for injuries or damage sustained as a result of the performance of the contract by the contractors.

A specific instance of such a situation arose in the case of Taylor vs. Walsh, decided in Missouri in 1916, wherein the defendant entered into a contract with Kansas City to construct a public sewer adjacent to the plaintiff's house. The work necessitated blasting for the excavation, and during the blasting operation the plaintiff's house was damaged by vibration. The court held that when a municipal corporation enters into a contract for the performance of work that is inherently dangerous and damage or injury results, the municipal corporation, being the author and promotor of the dangerous work, is liable, as well as the contractor, for the harm done. This liability attaches to the municipal corporation regardless of the skill or care with which the work may have been prosecuted.

In drawing contracts for public works municipal authorities have often inserted a clause providing that the contractor shall be liable for all injuries or damage arising out of the performance of the contract. This clause has been used under the erroneous impression that it relieves the municipality of liability to the traveler. Such a clause is ineffective so far as the injured is concerned. A municipal corporation cannot by agreement shift from its shoulders a responsibility that the law specifically imposes upon it.

However, an agreement on the part of the contractor to indemnify and save the municipality from any liability for claims for injuries to person or damage to property arising out of the performance of the contract is effective in compelling the contractor to reimburse the municipality for any moneys that the municipality may be compelled to pay as compensation for injuries or damage.

Work Done by Public Utilities

Many openings are made in public highways by individuals or corporations such as gas, telephone or electric companies or other public utilities for private or semi-public works. These individuals or corporations are known as licensees by reason of the fact that they make such openings by permission or license of the municipality. The question arises as to the liability of the municipality in the event of property damage or personal injuries sustained by reason of the negligence of the licensee.

The courts in all states agree that where the municipality has had notice of a dangerous condition of such an excavation and fails to remedy this condition within a reasonable time, the municipality is liable.

In the case of Von Longerke vs. City of New York, decided in 1912, it appears that during the course of construction of a large building, it became necessary to dig a tunnel in Fifth Ave. parallel to the curb in order to make a sewer connection. The necessary permit was obtained. The subcontractor, however, instead of making the excavation as planned, dug the tunnel about 10 ft. to the west, resulting in the breaking of a water main. Water flowing from the main flooded a nearby cellar in which goods were stored and caused considerable damage to the plaintiff, who sued the city of New York, among other defendants, for negligence.

It appears that the break in the water main was discovered about 5 o'clock in the afternoon. The department of water supply was apparently immediately notified. No attempt to close the gate was made until about 8 p.m., but even then nothing was accomplished. At about 11:30 p.m. an engineer of the department of water supply arrived and finally effected the closing of the main at about 1:30 the next morning.

The jury found a verdict in favor of the plaintiff and against the city of New York, on the ground that the city was negligent in having failed to shut off the water much sooner. The court in sustaining this verdict on appeal said in its opinion:

The city was under a legal obligation to use diligence in shutting off the water and for its failure to do so was liable to persons suffering damage by reason thereof.

Courts Disagree When Defects Are Unknown

As to whether the municipality is liable where it does not receive any notice of a defective condition, the courts of the various states seem to be in hopeless conflict. In some states the courts have definitely taken the position that when a municipality undertakes to license the making of an excavation by a private individual or corporation, it is charged with notice, by virtue of the issuance of this license, of the fact that a potential source of danger to the traveling public is about to be placed in the public highway. For this reason the courts have held that whether or not the municipality receives actual

or constructive notice of the dangerous condition of an excavation it is nevertheless liable for injuries or damage arising out of the negligence of the licensee.

In the Illinois case of Laue against the city of Chicago, decided in 1910, it appears that the city granted permission to build a concrete sidewalk 7 ft. above the surface of the ground. Before the concrete had set, the plaintiff attempted to walk on the slab, fell through the forms to the ground below and was injured. The court in sustaining the verdict of the jury in favor of the plaintiff stated that the municipal corporation is liable for the negligence of the private person or corporation whom it authorized to do work in a public highway in the same manner as it is liable for the negligence of a contractor with whom it contracts for the construction of a public improvement. The city is charged with the duty of keeping its highways safe for the traveling public, and it must answer for any unsafe condition of the highway even if this condition is caused by a private individual whom it has licensed to do work therein.

In contrast with this case there are many decisions in other states in which the courts have definitely held, to the contrary, that unless actual or constructive notice is given to the municipality, it cannot be held liable.

In the case of McDermott against the city of Kingston, decided in New York in 1879 but still quoted as good law, it appears that an action was brought against the city of Kingston to recover damages sustained by the plaintiff's intestate in falling at night into a ditch excavated in one of the city streets that had been negligently left unguarded by a gas company. The ditch was dug by the gas company pursuant to permission granted therefor. The court ruled that where an excavation is made by consent but without immediate supervision of the city, the city cannot be held liable for injuries or damages sustained. The opinion seems to indicate that where supervision is exercised by the city, liability will attach. The opinion in part follows:

> For any obstruction or defect created by the city for its own purpose in its streets or sidewalks, whereby persons are injured, the city will be liable, if the injury be due to negligence of the city officials or employees. The same result follows if the work on the streets or sidewalks be done by others by the consent and under the supervision of the city authorities. If a trespasser obstructs the ways of a city, whereby an injury occurs to an individual, the city will not be liable, except after notice, actual or constructive, and neglect to put the street in good condition after such notice. But if the work be done by the consent only of the city and not under its immediate supervision, the city will not be liable for the negligence of those doing the work, but only for its own negligence in not correcting the evil after notice, actual or constructive.

The municipal engineer would do well to inquire into the ruling of the courts on this subject in the state in which he is employed and be guided thereby in the issuance of permits for excavations for private works in public highways.

Trestle and Firebreaks on Kansas City Southern

AN UP-TO-DATE example of railway trestle construction is the Hazel Creek trestle (Fig. 2) of creosoted timber on a 23-mile extension of the Arkansas Western Railroad (an auxiliary of the Kansas City Southern Railway) built in 1930 to serve important lumber industries. With a length of 701½ ft. in 11½-ft. panels, about 500 ft. of the trestle has a height of 52 to 58 ft. in four and five stories. Four-post pile bents have a batter of 2½ in. per foot on the outer and ¾ in. per foot on the inner posts. Planks 3x10 in. are used in pairs for the horizontal or sash members of the bents and singly for the swaybracing. The longitudinal diagonal bracing consists of 7x8-in. timbers in four lines of longitudinal girts above each sash. Caps 12x14 in. and 14 ft. long carry the three-ply 8x16-in. stringers, on which are laid ties 7x8 in., 8 ft. long, with guard timbers of the same size. The deck is covered with galvanized sheet-iron for fire protection. This trestle is designed for Cooper's E-45 loading.

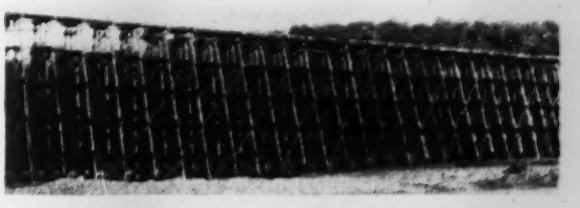


Fig. 2—Creosoted timber trestles, K.C.S. Railway

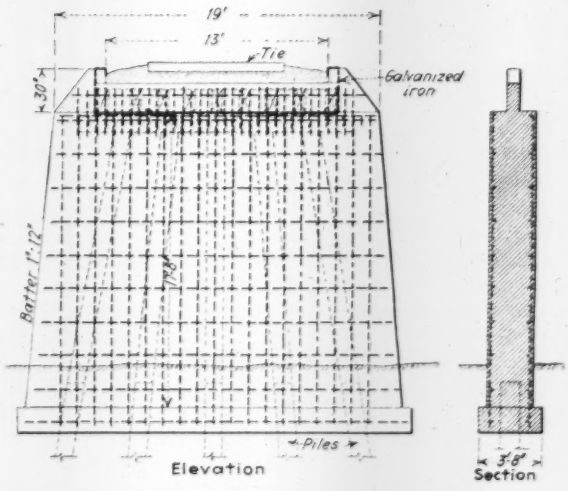


Fig. 1—Fire stop concrete pier

Piers at intervals are substituted for pile bents in trestles.

Reinforced-concrete fire walls (Fig. 1) will be used in a 1,400-ft. creosoted ballasted-deck trestle near Beaumont, Tex. Each of the two walls will take the place of a pile bent. This structure, to be built in 1931, will replace a 630-ft. trestle to give increased waterway for floods on the Neches River. Each wall, on pile foundation, will be 32 in. thick to the bottom of the stringers, above which an 8-in. partition wall will rise between the ends of adjacent stringers. Each end of this partition will be carried up as a curb to retain the ballast. For one panel on each side of the wall, galvanized iron will be placed around the guard timbers and under the stringers. These fire walls add little to the cost of the structure and should be effective in stopping the spread of fire.

The structures were designed by C. S. Heritage, bridge engineer, under the direction of A. N. Reece, chief engineer, Kansas City Southern Railway.

Artificial Groundwater for Wood-Pile Foundation

Well points provided through footings to permit saturation of foundation strata if the groundwater level drops

PIPES extending down through the basement floor and footings, through which water can be forced into the ground, are planned to keep the groundwater level from ever dropping below the tops of the foundation piles in the 24-story addition to the Northwestern Mutual Life Insurance Building in Milwaukee, Wis. Normally, at this level the groundwater will be under pressure that will be taken care of by a subfloor drainage system and by dense concrete, with lead-plate cutoffs in construction joints, in the basement walls and floors. In addition to groundwater control, the deep foundation excavation presented a nice problem in bracing a single line of steel-pile pit sheeting.

Ground Conditions and Excavation

The ground is a glacial desposit that has been filled in on top where, it is indicated, a marshy lake had existed. Below the fill were several feet of sand and gravel and then clay and stony clay of very irregular bearing power, down to hardpan at a depth of 150 ft. Rock was 100 ft. deeper. Groundwater level is about 17 ft. below the surface. Under these conditions the foundations adopted were naturally wood piles carrying footings for columns and basement walls.

The rectangular foundation pit (274x161 ft. and 46 ft. deep) had one long side adjacent to the old building and the three other sides bordering streets. These three sides had to be retained. The retaining wall adopted was a single line of steel piling with diagonal bracing to interior column footings. The excavation was carried down vertically on the building side and let to take the natural slopes on the street sides. This permitted the inside column footings to be built quickly and used as abutments for the wall braces.

The pile sheeting was driven through the pit slopes. The piles were 55 to 65 ft. long and were driven to about 10 ft. below subgrade in two stages, one driver starting them down between guide frames and driving two at a time, using a special driving cap, and the second driver completing the operation, driving one pile at a time. Both drivers were derricks with swinging leads. The distinctive features of the sheeting were the welded wales and brace shoes and the bracing shown by Fig. 1. The braces were placed in tiers as the slopes were taken out by clamshell. All the excavation was ordinary; considerable pumping was required before the sheeting was driven, but afterward the flow was moderate and easily handled.

Foundations and Drainage

Piles were adopted instead of a concrete mat because the bearing power of the ground varied greatly. The footings nearly covered the area; where they were less than a foot apart they were extended to a construction joint between where, farther apart, concrete struts were inserted. This construction transmitted lateral pressures from walls and bracing across the lot in both directions.

The foundation piles varied from 20 to 70 ft., depending on the ground; all were driven to a final penetration of $\frac{1}{8}$ in. per blow. Standard drivers were used in the middle of the lot for the footings built before the slopes were excavated and the bracing put in. Derricks and cranes with swinging leads drove the piles under the bracing. The leads had pointed feet that could be set into the ground, and their tops were held by guys. Where the piles were too long for the leads, a false pile was driven and pulled to punch a hole into which the permanent pile could be partly sunk. The close spacing of the piles caused some heaving, but with care in driving none of the completed footings was raised.

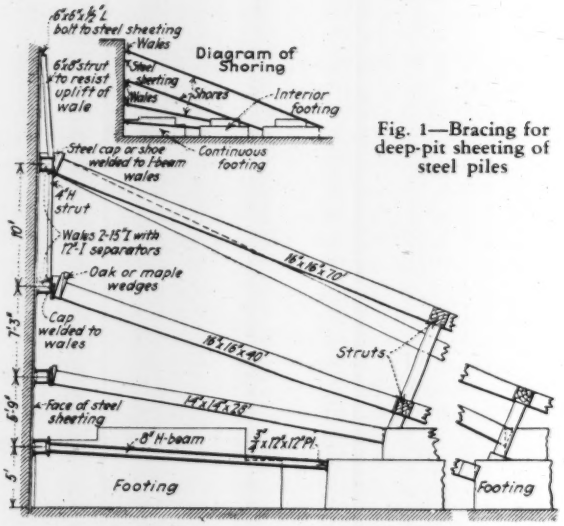


Fig. 1—Bracing for deep-pit sheeting of steel piles

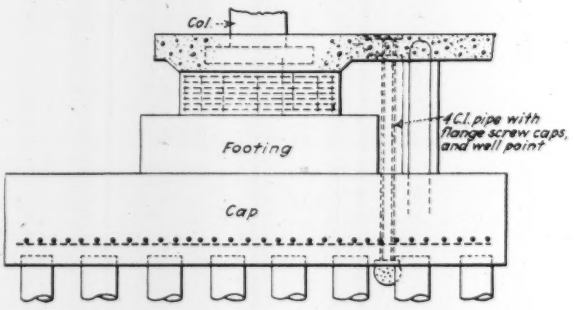


Fig. 2—Footing with well point to replenish groundwater

The special features of the foundations are the well points built into the footings and the lead water-stops at joints. The latter are 8-in. strips of $\frac{1}{8}$-in. sheet lead. The well points are merely lengths of 4-in. pipe with screw caps and strainer bottoms. The use of these pipes is considered a remote possibility; but if necessary, it is planned that water can be pumped into the ground and the pile tops kept submerged. Except that care was taken to secure a dense and watertight concrete, the concreting methods and plants used were ordinary.

The general contractor was W. W. Oeflein, Inc., Milwaukee, Wis. The Edward E. Gillen Co., Milwaukee, was subcontractor for driving the steel sheetpiling and wood foundation piling, while the Edward Radtke Co., also of Milwaukee, was subcontractor for excavation. The architects for the new building are Holabird & Root, Chicago.

LETTERS TO THE EDITOR

Bridge Clearances

Sir—The locks of the Panama Canal are 110 ft. wide. The British battle cruiser "Hood" was constructed with a beam of 105 ft. 7 in. The "Saratoga" and the "Lexington," airplane carriers, have a beam of 106 ft. They might have been built wider, but in spite of this possibility they were not built wider. Even if it did cramp their style somewhat, the builders of the "Hood," the "Saratoga" and the "Lexington" preferred to make them fit the Panama Canal and capable of passing through the locks rather than designing them to fit the Pacific and Atlantic oceans and a trip around South America.

Similarly, might not moderate clearances on the proposed 57th St. bridge across the Hudson at New York lead to the adaptation of masts and funnels to fit the bridge? A vast amount of money is expended in providing for imaginary possibilities which even as possibilities would be wholly non-existent if they were not imagined. GEORGE RUNCIMAN,
President, W. H. Witt Co.
Seattle, Wash.,
May 16, 1931.

* * *

Sir—The matter of bridge clearances has recently become a subject of active controversy. The following information is not given in the spirit of criticism, but rather for the purpose of assisting in formulating general practice by citing a definite case where the required clearances did not appear to the writer to be justified.

On March 8, 1929, a hearing was held at Richmond, Va., to consider plans for a toll bridge to be constructed across the James River at Varina Farm, located 60 miles above the bridge across the James River at Newport News. The plans prepared by the writer called for the same clearances that are provided by the Newport News bridge, which had recently been completed. These clearances were 147.7 ft. above mean low tide for the raised position of the lift span, and 250 ft. horizontal clear distance between fenders. The hearing was held and the shipping interests presented the usual objections so apt to be brought up at a bridge hearing. In truth they objected to a bridge of any type. On Nov. 29, 1929, a letter was received from the war department disapproving the plans, but stating, "Consideration will be given to plans which will provide a horizontal clearance between fenders of not less than 375 ft. and a vertical clearance when opened of 147.7 ft. above mean low tide."

The James River at the site of the Newport News bridge is some 6 miles wide, while at the site of the proposed bridge it is 600 ft. wide. A horizontal clearance 125 ft. greater was required at the latter site.

The result of this decision was that the bridge could not be built, because its anticipated income would not justify the large expenditure necessary, and traffic is still using a ferry that provides rather infrequent service, with a fare considerably higher than would have been the bridge toll.

P. K. SCHUYLER,
President, Federal Bridge Co.
Washington, D. C.,
May 22, 1931.

Questions Raised as to Water Laws

Sir—As a subscriber for 26 years to your journal, I have read your numerous editorial and news items regarding water law, water rights, etc. My interest in the Colorado River leads me to compare your theories of what should be done with various streams.

Sometimes I feel that those who follow engineering and use the same mathematics and physics regardless of localities are unfitted to discuss water rights, but since you essay this difficult task I desire to express some confusion in following your recommendations.

Apparently water law tends to become like Hancock's tariff, a local issue. I can understand why New Yorkers oppose the diversion of water from the Great Lakes by Chicago to obtain cheap sanitation, when this reduces the power at Niagara; also why they see the necessity for a new law (*ENR*, May 14, 1931, p. 795) to abrogate riparian law on the Delaware in favor of New York's domestic water necessities and why they can again reverse themselves to oppose the St. Lawrence ship canal being financed by New York's water-power resources.

No one should criticise the Mid-West for trying to exempt its products from the expense of railroad shipment and rehandling in New York. No one should criticise New York for attempting to retain its commerce, but it might profit more by being consistent. If commerce is diverted through the lakes-to-ocean canal, perhaps the Delaware water will never be needed by New York City.

New York might mildly oppose federal appropriations that would injure her commerce; but if her power were nationalized in order that it might pay for this canal, New York would resist the move to the utmost, just as Arizona has tried to prevent her power being taken to pump her water over a mountain range to irrigate an adjoining state.

Water law should be limited to one logical conclusion, and we should all be equal before it. Precedents should indicate its meaning, and ends should not be obtained indirectly if they are not legal when directly attempted.

If Maryland can tax the 378,000-hp. Conowingo project on the interstate Susquehanna River $500,000 per year, Arizona should have the right to tax the 1,200,000 hp. at the Hoover Dam, and New York should be able to tax St. Lawrence power projects.

If federal courts require the government to put up bonds to insure the recompense to private owners for lands submerged by overflow channels on the Mississippi (which to my layman view is actually a navigable stream), state and private holders of land to be submerged on the Colorado should be given equal protection.

If Congress may not purchase land for the erection of "forts, magazines, arsenals, dock-yards and other needful buildings" without the consent of the states (U. S. Constitution, Art. I, Sec. 8, Par. 17), can the federal government condemn land for power and irrigation purposes? Is not the public defense the first duty of a government, and is it to be presumed that a constitution which specifically limited federal actions on defense buildings gives unlimited authority to Congress to build dams and power houses?

If commerce is supreme on the Great Lakes, will it be likewise paramount on the Hoover reservoir? Can Arizona and her citizens be denied access to their lands bordering on this reservoir? Can they be denied the right to navigate the 120 miles of deepened river channel? Can this commerce, probably meager but infinitely greater than the "present" commerce that was used to justify dam construction, hold the reservoir water level to the elevation limit for flood control, thus precluding the emptying of the reservo" for power and irrigation purposes? If so, will not navigation, the creator of the Hoover reservoir, result in its economic failure?

How can there be navigation in a river below a dam if half of the water may legally be taken out above and the other half permanently removed below? Or better still, if your editorial is correct and Arizona has not been restricted in her use of water, how can there be any water left for navigation if Arizona may take all she can without restraint?

Is the paramount need of water for navigation dependent upon the refusal of some bureau chief to give right-of-way permits for a secondary need like irrigation or domestic use?

Did the court, without trying Arizona's suit, take judicial notice not only of a commerce that does not exist on the river but of the spirit that animates the department of the interior?

How does the supreme court find the authority to disregard the declaratory purpose of the child labor law and other laws and judge their real intent in finding them unconstitutional when Justice Brandeis says, "Into the motives that induced Congress to enact the Boulder Dam act, this court may not inquire"?

If the court cannot question the motive for or effect of legislation, may not Congress pass any law that a favorable administration or majority may desire and secure its constitutionality by declaring that it is the intent of the law to perform some constitutional action?

If so, and our court makes "new" law to judge each case, has it not surrendered its presumable function and become an executive-appointed third legislative body to determine matters of national or local policy, similar to the House of Lords of England, which also operates without a constitution?

I would like to read your comments if the supreme court dismissed without trial a matter that vitally concerned the whole State of New York, or if a bill to give New York's resources to Pennsylvania were not even read in the national House of Representatives. This occurred with the completely amended Boulder Dam act.

Would you agree with the supreme court that New York had not yet been hurt if applicants from your state had been denied permission to purchase power developed on your own soil while it had been contracted to another state's cities and corporations; or if every application of New York and its citizens for a permit to build dams on your rivers for power and irrigation purposes were cancelled in favor of a government project to be built in New York for the exclusive benefit of the citizens of Connecticut or New Jersey?

If you were a citizen of Arizona, how would you like an act that superseded all of your water laws and gave half the available water of one of your interstate rivers to part of the states for their slow development and a subsidy of $165,000,000 to another state to permit it to take the remainder for its quick development?

What would you say of national legislation that provided for the regulation of a stream, thus permitting an adjoining nation with an excess of cheap labor to obtain a moral claim to the use of its water without restriction, while an American state was obviously restrained from developing its resources?

This letter is not intended as a criticism of Congress. Its members are busy with many other matters that are to them more important. On questions they do not understand they follow the suggestions of those they believe informed. Arizona was too poor to match her antagonist in propaganda.

The supreme court is likewise not omnipotent. Its water-right decisions are exceedingly difficult for an engineer to understand. The famous Colorado-Wyoming case, which involved but one-tenth of one per cent of the water in the Colorado River, was in court for many years. When it was decided, the decision had to be amended. The law of prior appropriations was set up as the basis for that decision, but it was immediately thrown down when the senior appropriators were required to finance the development necessary to insure the junior appropriators their water.

Perhaps riparian law is obsolete and needs to be set aside as in the New Jersey-New York case in favor of a "new" law, but what I fail to see is how New York domestic use is more vital than Delaware navigation, while Chicago domestic use is inferior to lake navigation.

Perhaps prior-appropriation law in the Western states should be subordinated to the right to water by prior federal appropriations and bureau regulation, as in the Boulder Dam act, which you have supported.

On the contrary, it may be that the opposition to these "new" laws, which in Arizona's case you term "a desire for a limitless veto," may grow as other states experience the nationalizing of their resources and their conveyance to the sections of the country in temporary control of national power and influence.

THOS. MADDOCK,
Secretary, Colorado River Commission of Arizona.

Phoenix, Ariz.,
May 31, 1931.

New Orleans Water Board Defended

Sir—I have only recently been able to reply to the very remarkable editorial comment appearing in your April 30 issue, entitled "Politics Resurgent."

Your facts seem to be so very much confused as to be not only unrecognizable but to make the writer curious as to the source of your information.

I have been reading *Engineering News-Record* for a number of years and have always, heretofore, valued your articles and your editorial comments highly. As a matter of fact, the esteem in which I hold your publication is attested by the fact that I trouble now to supply you with a correct account of the recent retirement of George Earl as general superintendent of the sewerage and water board of this city, the unexpected resignation of John L. Porter, director of water-purification stations and the dispensing of the services of John T. Eastwood, engineer, in charge of sewer and water. I am certain that your sense of fairness will, after you have been correctly informed, prompt you to make editorial correction of the statements appearing in that issue.

I am attaching first a list of the members of the sewerage and water board to indicate the type of men who compose it, as well as the fact that the overlapping terms required by law do not permit of its being made into the "political football" that your editorial would infer.

Second, you will find a copy of the secretary's report under date of March 31 with certain paragraphs marked to indicate the financial situation that the former general superintendent had foreseen as far back as October, 1930, when he was directed to begin curtailments to bring expenditures within allowable limits.

Attached also are copies of Mr. Earl's request for retirement; the board's resolution granting this request and at the same time retaining Mr. Earl in a consulting capacity at a salary of $5,000 per annum; and the board's resolution appointing the writer to fill the vacancy.

All of the above became effective as of April 1; and on April 6, without previous notice of his intent to do so, the board received from John L. Porter his resignation as director of water-purification stations, to take effect at once. Copies of correspondence attached are records of the transaction that resulted in Mr. Porter's sudden and unexpected severance of his connections with the board and the assumption of his duties by a very able and efficient engineer, and one of long service with the board—A. Baldwin Wood.

The services of Mr. Eastwood were dispensed with for reasons given in my letter to him, a copy of which is attached.

You will please note that all changes, with the exception of Mr. Earl's retention as consultant, have resulted in the necessary economies desired by this board; and rather than a breaking up of the morale and efficiency of the organization, there has been a decided strengthening of it. No technicians or trained engineers have been discharged except where these have been employed temporarily on an intensive construction program that is now practically completed; and of the 200-odd employees discharged, the greater majority were laborers, truck drivers and unskilled workmen.

Please understand that the reduction in forces has in no wise affected the regular forces permanently employed to operate and maintain the drainage, sewerage and water systems of this city.

As to the local newspaper accounts, I am attaching two clippings: one from the New Orleans *Item* of March 30, giving an account of Mr. Earl's retirement; and the other from the editorial page of the New Orleans *States*, which latter can by no stretch of the imagination be classified as a "pro-administration" paper.

I am also attaching copies of letters taken at random from quite a number received by the writer at the time of his appointment, which would indicate that the successor of Mr. Earl and Mr. Eastwood (for I am doing the work of both gentlemen) was not of the type that politicians use as a "rubber stamp."

I have tried not to burden you with too long an account, believing that the record speaks best for itself and trusting you will carefully read it. I will be glad to answer any questions you may have to ask and trust I may soon read of your correction of the very ugly editorial that I refer to as the cause of this letter.

BRYSON VALLAS,
General Superintendent,
Sewerage and Water Board of New Orleans.

New Orleans, La.,
June 9, 1930.

The report of the secretary of the board, which was attached to Mr. Vallas' letter, stated that as all the proceeds of a $9,000,000 bond issue would be expended by June 30 the board would have to keep its expenditures within the revenues accruing from month to month, hence drastic economies would be necessary. An extract from a letter of Mr. Earl's, dated Oct. 9, was included in the secretary's report. It pointed out the need for the drastic economies that the board put into effect in March. The editorial from the New Orleans *States* was a recognition of the value of both Mr. Earl's and Mr. Vallas' services to the city.
—EDITOR.

NEWS OF THE WEEK

New Jersey to Sue New York City for Beach Pollution Damages

At a hearing in Washington last week to determine how long New York City should have to complete a new system of garbage disposal, Duane E. Minard, assistant attorney general of New Jersey, served notice that his state would file suits against New York City for damages resulting from pollution of its resort beaches by New York garbage dumped at sea.

Mr. Minard indicated that New Jersey would not be satisfied with a ruling setting a date for the completion of incinerators, but would seek immediate action to compel New York to take emergency measures for garbage disposal.

New Orleans Subcontractors Organize to Fight

Subcontractors of New Orleans have reorganized under the name of the Allied Subcontractor Group, Inc., in an effort to end alleged abuses from general contractors. The subcontractors claim their prices are beaten down by general contractors after they have submitted fair bids and that unfair prices must be accepted to get work at all. They further allege that certain contractors fail to pay their subcontractors' bills or materials bills. F. E. Reiss, manager, National Materials Co., has been elected president of the reorganized group.

Sanitary District Reports to Supreme Court

Every six months the Sanitary District of Chicago must report to the U. S. Supreme Court progress on its construction program, sewage treatment and amount of diversion of waters from Lake Michigan. A summary of the latest report follows.

Completed work as of June 1 amounted to $96,231,594, which is $1,079,370 more than reported for Dec. 1, 1930. Future work yet to be done in accordance with the schedule is $173,325,000.

Treatment on the 100 per cent basis is somewhat less than at the last report because of the decrease in industrial waste due to the depression. About 30 per cent of the total sewage of the total population and industrial wastes is being treated.

The diversion for the six months' period averaged 7,840 sec.-ft., from which is to be deducted 1,620 sec.-ft. domestic pumpage by the Chicago metropolitan area, making a net diversion of 6,220 sec.-ft., against the limit of 6,500 sec.-ft. of the permit from the secretary of war.

Strict Prevailing Wage Law Holds Up Chicago Contracts

PASSAGE of a prevailing wage law in Illinois, effective July 1, has deferred the letting of certain large contracts through the necessity of readvertisement for proposals, so that the provision for insertion of those rates in the advertisement may be complied with.

The Sanitary District of Chicago has postponed the date on which to receive bids on the Calumet extension work from July 16 to a date not yet set, probably July 30. Cook County has 9 miles of paving which is in the pre-contract stage and may be delayed. Other provisions of the new law, which regulates wages and hours of mechanics and laborers on public work in all municipalities or other subdivisions of the state, are to the effect that ten taxpayers may protest as to the correctness of the rates published in the advertisement. The complaint is to be referred to an appeal board of three appointed by the governor from a list submitted by the municipality, the contractors' association and the "largest federated body of organized labor in the state."

Second Violation Voids Contract

The contractor will not benefit by paying less, since for the first violation he must return to the municipality the difference between the actual and the prevailing rates. A second violation voids the contract and may be a cause for disqualification of the contractor under any prequalification law or rule. The director of labor on his own initiative or on petition of ten taxpayers shall ascertain wages paid and enforce the law, but appeal can be taken from his action to a board appointed by the governor as noted above.

The law does not apply to articles or material manufactured at a distance, their transportation or handling. A clause making legal those contracts entered into after July 1 but for which advertisements were run previous to July 1 was cut from the original bill, thus casting doubt on the validity of such contracts.

Constitutionality Questioned

The law is viewed with apprehension by municipal officials as well as contractors, since ascertainment of wage rates to publish in the advertisements is a difficult procedure and once set leaves the contractor no chance to follow changing conditions. Constitutionality of the law is questioned because of its restrictions on the rights of individuals.

Ambrose Swasey Gives $250,000 to Engineering Foundation

An additional gift by Ambrose Swasey of $250,000 to the Engineering Foundation, bringing the total to $750,000, was announced at a dinner in New York on June 30, at which Mr. Swasey was the guest of honor. Mr. Swasey, born at Exeter, N. H., nearly 85 years ago, is the surviving member of the firm of Warner & Swasey, of Cleveland, Ohio, famous for the building of great telescopes, and of instruments and machine tools of precision. The Engineering Foundation was founded in 1914 on the basis of his conception of a research instrumentality for the profession of engineering and for broad services to mankind.

In making this latest gift Mr. Swasey said: "For many years past, and especially since 1914, I have thought that a great service to mankind might be rendered by the stimulation of research and development work in the engineering profession, and have sought to further that end by assisting in establishing the Engineering Foundation, whose income would be available for such purposes."

Ground Broken for Wards Island Activated Sludge Plant

Formal ceremonies incident to the beginning of construction on the 180-m.g.d. sewage-treatment plant on Wards Island, the first unit in New York City's extensive program for the reduction in pollution of its rivers and harbor, were held on July 7. The plant will be of the activated-sludge type, operated entirely by electricity, and will remove from the East River the pollution from an equivalent population of 1,350,000. It will remove more than 90 per cent of the suspended matter and 95 per cent of the bacteria from the sewage treated. To determine the possibilities of fertilizer manufacture from the sludge, an experimental plant large enough to handle 25 per cent of the sludge will be built as part of the project. The remainder will be dumped at sea from specially designed boats.

The total estimated cost of the new plant is $16,000,000, and of intercepting sewers, tunnels and appurtenant works, $14,000,000. It is being built by the department of sanitation, of which Dr. William Schroeder, Jr., is chairman, and L. C. L. Smith engineer commissioner. The designing engineers are Fuller & McClintock, with Pearse, Greeley & Hansen, Chicago, as associates. Contracts have already been awarded to W. H. Gahagan, Inc., and the Frederick Snare Corp. covering parts of the work.

Conference of Pennsylvania Water Works Operators

At the fourth annual conference of the Pennsylvania Water Works Operators' Association, held at State College, Pa., June 24-26, the total registration was 202, a 25 per cent increase over last year's attendance. Many papers were presented, among them the following:

"Elementary Principles of Water Purification," by M. E. Flentje, Harrisburg, Pa.; "The New Filter Plant at Erie, Pa.; Bases of Design," by John T. Campbell, Pittsburgh, Pa.; "Filter Washing: Theory and Application of Sand Expansion as an Index," by Roberts Hulbert, Detroit, Mich.; "Further Developments in the Ammonia Treatment of Water," by J. F. T. Berliner and A. E. Howe, Wilmington, Del.; "The Influence of Soils, Rocks and Minerals on the Potability of Water," by John J. Shank, Waynesboro, Pa.; "Drought Problems," by H. E. Moses, Harrisburg, Pa.; "The Waterworks Man and the Public," by H. B. Richards, New Castle, Pa.; "The Filtration of Stored Water at Langeloth, Pa.," by J. Z. Columbia, Burgettstown, Pa.; "The Lime Soda Process of Water Softening," by Frank W. Bouson, Pittsburgh, Pa.

At the business meeting the secretary was placed on a salary basis and the following officers were elected: president, George R. Taylor; first vice-president, E. C. Trax; second vice-president, Martin E. Flentje; secretary-treasurer, I. M. Glace.

Salt Lake City Votes Bonds to Increase Water Supply

Approval of a $2,000,000 bond issue for increasing the city's water supply was voted at a bond election in Salt Lake City on July 1. The vote was about two to one in favor of the bonds.

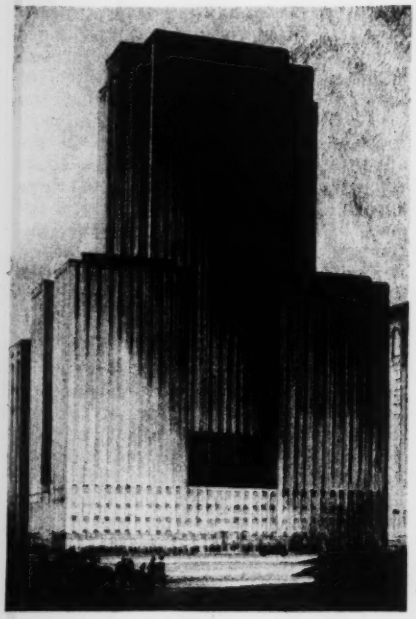
Of the $2,000,000 bonds authorized, $1,300,000 will be used to replace short-term notes, the proceeds of which are already being used to provide increased water supply, and the remaining $700,000 will be used for distribution system improvements and other items.

The principal items in the program involving the expenditure of the original $1,300,000 are: Murray artesian basin project, which will bring about 20 sec.-ft. of water from an artesian well basin southeast of the city into the city water mains; the Little Cottonwood project, which will deliver a minimum of about 6 sec.-ft. of direct flow from Little Cottonwood Creek, a mountain stream which flows from one of the canyons southeast of the city; and various savings or conservation projects that will increase the supply by about 8 sec.-ft.

The part of the program included in the additional $700,000 expenditure includes the following major items: three distribution reservoirs to cost a total of $205,000; a conduit from Mountain Dell reservoir to the Parley's Canyon Sunnyside intake, $110,000; supply line in the southwest section of the city, $75,000; removal of Murray City power plant to permit of proposed construction work on Little Cottonwood project, $95,000; Little Cottonwood pumping plant, $50,000; purchase of additional protective area and water rights in either or both of the Murray artesian basin and Little Cottonwood projects.

Public Building Awards in 1931 Now Total $1,815,288,788

According to a statement issued June 29 by the President's Emergency Committee for Employment, the awards for public and semi-public works construction projects since Dec. 1, 1930, have reached $1,815,288,788. The projects include federal, state, county and municipal buildings; school and college construction, hospitals, churches, bridges, sewers, streets and highways, levee work, pipe lines, power plants and other public and semi-public construction.



MARSHALL FIELD OFFICE BUILDING, CHICAGO

A 44-story office building to be built by the Marshall Field estate on Adams St. between La Salle and Clark Sts. will be a notable addition to the group of tall buildings along La Salle St., in the heart of Chicago's financial district. Its site is 323x190 ft., but the west portion, fronting on La Salle St., will be built first. The main portion, covering the entire lot, will have 22 stories, but above this will rise a 22-story tower 224x75 ft., reaching a height of 547 ft. above the sidewalk. Architectural finish includes black granite with stainless steel trim for four stories and buff limestone facing above this. Graham, Anderson, Probst & White, Chicago, are the architects. The cost, exclusive of land, will be about $15,000,000. Work is to be commenced in 1931 and completed in 1933.

Am.Soc.C.E. Board Votes for Engineers' Registration

A vote favoring the principle of registration for engineers and authorization of appointments to a joint committee of national engineering societies to consider the desirability of organizing state engineering councils were notable actions taken by the board of direction of the American Society of Civil Engineers at its sessions this week prior to the Tacoma meeting of the society July 8 to 10. With seventeen members present, the board held its sessions at Paradise Inn, Rainier National Park.

In response to a request from the American Engineering Council asking for the official attitude of its member organizations on the subject of registration for engineers, the board voted without reservation in favor of registration. At the request of the American Institute of Electrical Engineers, appointment of three members to a joint committee of the Civil, Mining, Mechanical and Electrical Engineering societies and the American Engineering Council was authorized to consider the desirability of organizing state engineering councils. Such councils would be established for the purpose of representing the profession in legislative and other non-technical matters.

A suggestion that certain of the society's publications might be issued to members only upon payment of additional charges was studied, and the board adopted the recommendation of the committee on publications that the established practice of free distribution be continued.

Question as to the advisability of establishing state sections of the society with local branches, as differentiated from the present system of sections, was discussed at some length and was referred to a committee.

Lieut. Hans Kramer was awarded the 1931-32 Freeman traveling scholarship, a reappointment. Formation of a student chapter at Pennsylvania Military College was approved. David C. MacMurray was awarded the society's scholarship at Columbia University. Junior members were accorded the right to participate hereafter in the elections and in the management of the technical divisions.

The board adopted a resolution to the effect that in considering registration laws there should be no subdivision of classification under the broad term of engineering profession. The engineering members of the architect-engineers' committee having been released, the board adopted a resolution expressing its appreciation for the time and effort that had been devoted to the matter by these members.

Several requests for new or increased appropriations were denied as a result of the society's somewhat impaired income resulting from the general depression. However, additional appropriation was granted to the support of the engineering employment service conducted by the society.

Hoover Dam Notes

The Hoover Dam power line and substation were formally dedicated June 27. The line was in operation two days before the formal dedication. A large party of guests from numerous points throughout the Southwest was in attendance.

The report for the week ended June 30 shows rapid progress being made on the railway line down Heminway wash and to the gravel pit.

The face of the Arizona adit has been advanced to 490 ft. Lateral drifts are in 92 ft. on the upstream side and 130 ft. on the downstream side. Excavation of the Nevada adit was discontinued and work started both ways on the inner Nevada diversion tunnel. Excavation of the outlet portals in the Nevada tunnel is being pushed with three shifts. A crew is stripping the face of the cliff above the outer Arizona tunnel and a heading was driven through part of the portal excavation.

There are now 1,100 men on the Six Companies payroll. All of the dormitories and mess houses are being operated at capacity. A large labor turnover is resulting from the hot weather. One death has resulted from heat prostration. As a result all employees are being examined physically and only those who are physically qualified to undertake such work are being retained.

Ten bids were received for the construction of streets, sidewalks, water system and sewer system for Boulder City. The New Mexico Construction Co. was the low bidder, at $273,972. Work on houses is delayed because of difficulty in securing deliveries of materials.

Installation of the sump tank at the river intake began June 24. Because of extreme heat little progress has been made. In the future the work on this project will be carried on at night only. The concrete has been poured for the river intake. Excavation for the pump house and for the main sedimentation basin is nearing completion. The excavation for the pumping plant has been completed.

All poles have been set for the 33,000-volt line. More than 2½ miles of cable has been laid on the crossarms, most of which has been sagged. The work is being delayed because of non-receipt of hardware. The cables have been placed between the Nevada-California substation and the transformer substation. Transformers and switches have been mounted. Final designs for electrical distribution have been completed and advertisements issued for the materials that will be required.

The grade on the Boulder City-Hoover Dam railroad has been completed and the ditching done to station 240. From station 240 to station 340 the rough part of the grading has been completed. Ties and rail have been distributed. Rail is being bent for the curves. Work on the tunnels is continuing with three shifts per day. Tunnels No. 1, No. 2 and No. 3 are practically complete. Tunnel No. 4 was to have been holed through July 4. The pioneer hole on tunnel No. 5 is in 40 ft.

Material necessary for the completion of the grading of the Boulder City-Hoover Dam highway has been assembled. Gravel and oil have been placed on half of the highway and much of it already is carrying traffic. It is expected that the highway will be complete before the middle of July.

The spillway model at Montrose is nearly complete and tests will start in a short time. Tests already have started at the model at Fort Collins.

Wide World Photo

CLEVELAND'S AIR TRAFFIC TOWER

The first air traffic tower to regulate the taking off and landing of planes by means of a short-range voice radio transmitter informing pilots of ground conditions on the field has just been installed at the Cleveland municipal airport. In addition to regulating ships in flight by radio, the system includes a device by which the positions of all airline planes leaving or approaching Cleveland are marked on a map and may be seen at a glance. All field boundary lights, obstruction lights, building and flood lights are controlled from a switchboard in the tower.

Large Floating Dock to Be Towed 13,000 Miles

A huge floating dock for the harbor board of Wellington, New Zealand, is nearing completion in the yards of Swan, Hunter & Wigham-Richardson at Wallsend-on-Tyne, England. The dock is 584 ft. long and 117½ ft. wide and has an inside clear width of 88 ft. between fenders. Its lifting capacity is 17,000 tons. It is being launched in three sections, which will be joined up and towed to New Zealand later in the year by way of the Suez Canal and the Torres Straits. The tow will be the longest on record, 13,000 miles, and the dock will be the largest mass towed, for though the famous Singapore Dock, built at the same place, was in the aggregate larger, it was towed to its destination in sections.

WASHINGTON NOTES

By PAUL WOOTON
Washington Correspondent

Federal Board, Under Wagner Law, to Place Construction Projects on a Continuous Six-Year Cycle

LONG-TIME plans for stabilizing employment, now taking shape in the hands of Donald H. Sawyer, director of the federal board created by the Wagner law, do not contemplate postponement of federal construction projects that normally would be undertaken from year to year. The board's objective, as defined in the law, is to place federal construction work on a continuous six-year cycle. This method of advance planning will make it possible in an emergency to move up, by one, two or three years, projects slated for a later date on the six-year schedules prepared by the 25-odd construction agencies of the government.

Operation on Six-Year Basis

As in the past, the army Corps of Engineers, the navy Bureau of Yards and Docks and the other agencies will formulate their own programs of construction activity, without recommendation or interference from the board, but all will operate on a six-year basis in the future, and the board will coordinate these separate schedules for the purpose of depicting the whole government construction program as it moves along from one year to the next. In order to keep in close touch with the progress of construction schedules the board is planning to call upon the government departments and agencies for monthly reports on the status of all projects. This report will cover a description of all projects and such information as estimated cost, date approved, date of site acceptance, date of award, date to

The Business Outlook

The psychological stimulus of the moratorium and of other emergency efforts to insure stability abroad has slackened. Security and commodity markets have sagged or are marking time till favorable news offers further nourishment for enthusiasm. Meanwhile business indicators, except in certain sensitive retail lines, still register no concrete effect of increased confidence. Still, it is increasingly evident that the explosive materials for a major upswing of surprising speed and proportions are accumulating in the unprecedented credit position of the Reserve system, the curious currency situation, the continued imports of gold, the abnormally unbalanced condition of commodity stocks. These factors alone are automatically forcing a reversal of deflation.

—The Business Week, July 8.

complete, funds expended and percentage completed on date of report.

No attempt will be made by either the board or the construction agencies involved to draft detail plans of buildings or other public works long years ahead. This stage will be reached as date of execution approaches and, of course, will be advanced in the event of an emergency requiring release of projects for the purpose of providing employment.

Board Must Forecast Depression

The board is also charged with forecasting whether, at any time, a period of business depression and unemployment is in prospect six months hence. As this is a condition upon which the world's foremost economists have never been able to agree, only the future will disclose whether the board's powers of deduction will correctly anticipate a recession in industry and trade. Right or wrong, however, such forecasts will serve the purpose of preparing for the release of construction work by a certain date. Plans will be brought to the point of calling for bids and all will be in readiness for throwing thousands of men into the breach if depression comes.

Time Element in Bids

Early in June the comptroller general was asked by the interior department for his opinion as to whether or not the time element could be considered as a factor in determining the low bidder on a construction job at one of its hospitals. After considering the matter for a month the comptroller general has ruled that a government contracting officer cannot award a contract to other than the low bidder merely because a clause was put in the invitation for bids stating that time would be a factor.

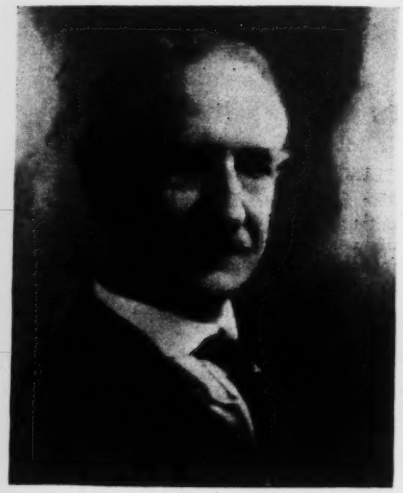
The interior department stated in its invitation for bids that "time of performance would be an element in awarding the contract," but did not add that bid prices would be evaluated and the higher bidder accepted because such bidder proposed to do the work within a shorter period than the low responsible bidder. The project involves building a two-story tuberculosis annex to St. Elizabeth's Hospital in Washington, for which an appropriation of $240,000 is available.

Although the W. P. Rose Co., of North Carolina, submitted the lowest basic bid of $185,000, the interior department desires to award the contract to the Adams Construction Co., of Washington, which agreed in its bid to do the work in 65 days less time than the Rose company. The Adams company bid, $190,980, was the fourth lowest. As the specifications provided that the time of performance would be considered in awarding the contract, the department has assessed the Rose company with a penalty of $80 a day for the difference of 65 days. By adding this penalty of $5,200 to the Rose company's bid and by throwing in one of four alternate bids, the Adams company is made the low bidder by a slight margin.

G. F. Swain, Professor Emeritus at Harvard, Dies

George F. Swain, professor emeritus of civil engineering at Harvard University, died on July 1 at his summer home in Ashland, N. H., at the age of 74.

Prof. Swain, who was born in San Francisco, was graduated from the Massachusetts Institute of Technology in 1877 and subsequently studied for three years at the Royal Engineering School in Berlin. On returning to this country



Prof. George F. Swain

he was instructor at the Institute from 1881 to 1883, assistant professor and associate professor from 1883 to 1887, and professor of civil engineering from 1887 to 1909, when he was called to a similar post in Harvard. He retired from teaching in 1929.

Besides being noted for his outstanding merit as a teacher, Prof. Swain also held positions of prominence outside of the teaching profession. He was consulting engineer to the Massachusetts Railroad Commission from 1887 to 1914, and from 1894 to 1918 was a member of the Boston Transit Commission, during the last five years of that period being chairman. As a member of the Transit Commission he did much to show how subways should be constructed, and that such undertakings can be executed on time, within estimates and without inconvenience to the public.

He appraised the assets and liabilities of the New Haven Railroad for the Massachusetts State Commission in 1910 and made like valuations of the New York Central, the Chicago elevated railway and several Canadian railroads. In 1918 Prof. Swain went to France as a member of a delegation of American engineers, and the next year was a member of the Franco-American Engineering Commission.

Prof. Swain was a past-president of the American Society of Civil Engineers, the Boston Society of Civil Engineers and the Society for the Promotion of Engineering Education. He was also a member of the Institute of Civil Engineers of Great Britain, Engineering Institute of Canada, American Railway Engineering Association, American Society for Testing Materials and New England Water Works Association.

During his busy life Prof. Swain found time to write many books and professional papers for engineering periodicals. Among his books were "Conservation of Water by Storage," "The Young Man in Civil Engineering," "How to Study," "Strength of Materials" and "Fundemental Properties of Materials."

1931 Highway Construction Estimated at $1,616,110,563

This year's volume of highway construction is estimated by the U. S. Bureau of Public Roads, following a canvass requested by President Hoover, at $1,616,110,563, a net increase of $14,943,108 over last year. The net increase represents the difference between an expected increase of $154,249,000 in the expenditure of federal funds and an expected decrease of $139,305,892 in state and local expenditures on road construction. Included in the $259,897,000 total of federal funds are the regular federal-aid 50-50 allotments, the emergency appropriation of $80,000,000 made available to the states for matching federal-aid money, and comparatively small sums drawn from forest road, park service and public lands treasuries. Estimated expenditures by state and local governments this year are estimated at $1,356,213,563.

New Laws Extend Scope of California Registration Act

Supplementing the California civil engineers' registration act of 1929, two new legislative enactments have been passed, extending and strengthening the briginal bill. One of these acts provides that no person shall use the title "structural engineer" unless he is a registered civil engineer in the state and in addition has been found qualified for such special practice according to rules and regulations that may be established by the board. The other bill amends the original act and provides the following major changes: makes it unlawful to "offer to practice" as a civil engineer (the original act made it unlawful only "to practice"); defines the term "civil engineering" specifically and defines a civil engineer as one who practices or offers to practice in any one of the designated branches; gives the board power to suspend a certificate, whereas before only the power to revoke was given; extends grounds for action by the board to include deceit, misrepresentation and violation of contract, whereas the original act provided only for "gross incompetency."

Churchill, Manitoba's Seaport, to Be a Model Town

The town of Churchill, seaport of Manitoba and terminus of the Hudson Bay Railway, which will be ready for settlement next year, will be constructed under the town planning system approved by the provincial minister of mines and natural resources. The plans call for the construction of a model town, with central heating, fireproof public buildings, semi-fireproof residences, and boulevards, parks and squares. No property will be sold, but the lots will be leased for 50 years, the leases being subject to revision every five years.

Binghamton, N. Y., Votes to Adopt City Manager Plan

In a special referendum in Binghamton, N. Y., on June 30, the city manager form of government was approved by a majority of 1,776, the vote being 6,276 for to 4,500 against. The new form of government will go into effect on Jan. 1 and a city administration ticket will be elected in the November general election. Under the new system the people will elect a mayor and six councilmen, and the latter will choose the manager.

Construction Material Still Moving Slowly

Movement of the principal construction materials is in greatly lessened volume, compared with the cumulative totals at this time last year. The drop in production is most severe in commercial steel castings, steel ingots and lumber. Contraction of stocks is carried furthest in brick, floor and wall tile and porcelain plumbing fixtures. Even lumber shows a decrease in reserves of 6.4 per cent, due mostly to shutting down of small mills. This material hitherto has shown a persistent excess of mill stocks. Following are the percentage decreases in production, shipments, stocks, etc., in fifteen materials this year, compared with the corresponding period of 1930:

COSTS AND CONTRACTS

ENR Index Numbers

Cost			Volume		
July 1, 1931		174.37	June,	1931	243
June 1, 1931		187.37	May,	1931	251
July 1, 1930		200.95	June,	1930	324
Average, 1930		202.85	Average,	1930	260
Average, 1929		207.02	Average,	1929	317
1913		100.00	1913		100

This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of July 9, with some comparisons, total as follows:

(In Thousands of Dollars)

	July 9, 1931	Average of Last Four Weeks 1931	1930
Buildings:			
Industrial	$5,942	$2,782	$7,557
Other	15,863	16,198	30,903
Street and roads	17,227	14,665	14,163
Other eng. constr.	28,734	16,471	10,772
Total	$67,766	$50,117	$63,396
Total, all classes, Jan. 1 to July 9:			
1931			$1,501,789
1930			1,962,576

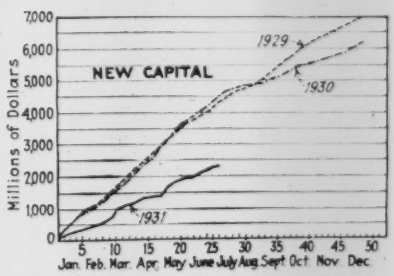
Society Proposes Unemployment Relief Fund

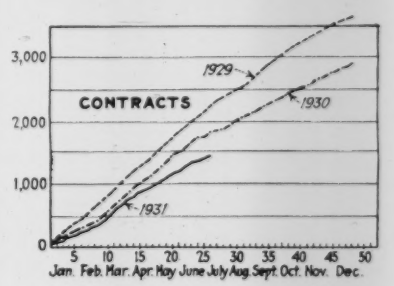
For the future relief of engineers in subordinate positions the Western Society of Engineers through a committee on emergency relief has developed a plan that will result in an accumulation of a savings fund to tide such engineers over periods of idleness. Briefly it is a plan to accumulate an individual savings fund by the cooperation of the employer and employee administered by the latter. An account is to be opened in a savings bank by the employer but designated by the employee, into which is to be deposited a minimum of $10 per month. 80 per cent from the employee's pay check and 20 per cent contributed by the employer. In times of unemployment the employee may draw on the fund to the extent of two-thirds of his weekly pay until the fund is exhausted. In normal times when the funds reach a sum deemed larger than necessary for safety, the employee may draw out his 80 per cent of the excess over a maximum agreed upon and the 20 per cent will be returned to the employer. The committee, headed by Albert Smith, is enlisting the support of a hundred employers of engineers in Chicago toward putting the plan into effect.

Capital and Contracts

New capital issued in the week ended July 4 totaled 27 millions private and 7 millions public, a sharp drop from totals of the preceding week, which were 147 and 19, respectively. The principal issues were: State of Montana 4½s, $2,096,000 for institutional building; Mamaroneck, N. Y., 4½s, $197,000; and Cambridge, Md., 4½s, $50,000. Cumulatively, the total is 2,314 millions, compared with 4,338 at this time last year, a drop of 46.6 per cent.

Contracts awarded last week totaled 40 millions, compared with 36 in the preceding week. The total to date is 1,434 millions, compared with 1,905 in 1930, a decrease of 24.7 per cent.





	Cumulative 1931	Cumulative 1930	Per Cent Change in 1931
Fabricated Structural Steel:			
Bookings, tons, 5 mos.	950,800	1,245,200	—23.6
Shipments, tons, 5 mos.	796,000	1,324,000	—39.8
Fabricated Steel Plate:			
New orders, tons, 5 mos.	139,093	221,664	—37.1
Commercial Steel Castings:			
New orders, tons, 5 mos.	220,312	522,445	—57.7
Production, tons, 5 mos.	243,935	545,776	—55.5
Steel Ingots:			
Production, tons, 5 mos.	13,182,609	20,160,084	—34.8
Cement:			
Production, barrels, 5 mos.	46,011,000	58,655,000	—21.5
Shipments, barrels, 5 mos.	42,364,000	51,357,000	—17.6
Stocks, barrels, end of 5 mos.	29,447,000	30,891,000	—4.5
Brick, Common:			
Stocks, fin., end of 5 mos.	209,094,000	303,971,000	—31.0
Unfilled orders, end of 5 mos.	44,415,000	137,980,000	—67.8
Lumber, Softwood:			
Production, M ft., 22 wks.	3,978,375	6,053,339	—34.4
Shipments, M ft., 22 wks.	4,327,504	5,743,132	—24.8
New orders, M ft., 22 wks.	4,290,328	5,672,836	—24.4
Unfilled orders, end of 22 wks.	633,268	863,702	—26.6
Stocks, M ft., end of 22 wks.	3,670,070	3,926,401	—6.4
Enameled Sanitary Ware:			
New orders, no. of pcs., 5 mos.	790,115	1,116,190	—29.2
Shipments, no. of pcs., 5 mos.	866,465	1,113,534	—22.1

	Cumulative 1931	Cumulative 1930	Per Cent Change in 1931
Floor and Wall Tile:			
Production, sq.ft., 4 mos.	12,907,737	14,124,299	—8.5
Shipments, sq.ft., 4 mos.	12,816,136	14,392,090	—10.5
Stocks, sq.ft., end of 4 mos.	14,661,881	17,770,911	—17.5
Porcelain Plumbing Fixtures:			
Shipments, no. of pcs., 5 mos.	21,232	28,548	—25.6
New orders, no. of pcs., 5 mos.	28,014	40,443	—30.6
Unfilled orders, no. of pcs., end of 5 mos.	11,387	35,078	—67.5
Stocks, no. of pcs., end of 5 mos.	28,394	36,920	—23.3
Prepared Roofing:			
Shipments, squares, 4 mos.	6,432,867	8,706,001	—26.1
Range Boilers:			
Production, no., 5 mos.	242,396	268,733	—9.7
Shipments, no., 5 mos.	244,730	274,653	—10.9
Stocks, no., end of 5 mos.	28,565	20,425	+39.6
New orders, no. 5 mos.	231,229	271,678	—14.7
Unfilled orders, no., end of 5 mos.	15,021	30,007	—50.0
Steel Boilers:			
New orders, no., 5 mos.	3,079	5,092	—39.7
Terra Cotta:			
New orders, tons, 5 mos.	16,373	34,096	—52.0
Vitreous China Plumbing Fixtures:			
New orders, no. of pcs., 5 mos.	677,330	903,216	—25.0
Shipments, no. of pcs., 5 mos.	735,746	1,002,307	—26.6
Unfilled orders, no. of pcs., end of 5 mos.	200,893	342,677	—41.5
Stocks, no. of pcs., end of 5 mos.	594,239	626,429	—5.1

Brief News

TRAFFIC through the Holland tunnel in the first six months of this year totaled 5,996,115 vehicles, an increase of 315,525 over the number for the corresponding period of 1930.

VIRTUAL REBUILDING of the county sewage-disposal plants at Bessemer and Ensley, Ala., is contemplated, and plans are now being drawn under the direction of the Jefferson county commission. Modernization and enlargement of the capacity of the plants are contemplated.

MORE THAN $3,000,000 will be expended in roads in the vicinity of Tacoma, Wash., during the next two years, including $1,214,900 to be spent in Rainier National Park. The National Park Highway, state road No. 5, will be improved by the expenditure of $220,000 during 1931.

CONSTRUCTION OF A BRIDGE over the St. Lawrence River between the Island of Orleans and the mainland, near Beaupre, is authorized in a bill which has passed the Canadian parliament. The bridge will be built by the Quebec provincial government and the plans call for a clearance of 85 ft. from high water.

EXTENSIVE STUDY of underground corrosion of water pipes to determine how such losses may be reduced is being undertaken by Leonard Day, water commissioner of St. Louis, Mo. The waterworks properties of St. Louis are valued at $50,000,000, of which about $23,000,000 is invested in underground pipes, valves and boxes.

ELIMINATION of the pollution of Lake Erie by sewage from Buffalo and other communities will be discussed at a conference called for July 10 in Albany by Governor Roosevelt, of New York. The mayors of the municipalities involved have been asked to attend and explain what they are doing or contemplating in the way of installation of sewage-treatment works.

A NATIONAL CAMPAIGN for 10,000 American Legion posts to conduct surveys on needed public improvements in their communities and then get behind movements in cooperation with the proper public officials to have these projects started is announced by Howard P. Savage, chairman of the legion's national employment commission, and Ralph T. O'Neil, national commander.

A NATIONWIDE SYMPOSIUM on "engineering progress," consisting of published statements by leaders of thought in many fields, will be conducted by the Engineering Foundation. The object, it is announced, is, by showing the benefits from engineering progress, "to advance the good of mankind by stimulating resourceful Americans to think their way through the passing months of maladjustment into effective action that will restore our normal state of steadily ascending happiness and freedom."

Personal Notes

ARTHUR E. GORMAN, lately with the Pardee Engineering Co., became filtration engineer of Chicago on July 1.

HARRY C. MCCLURE, until recently city engineer of Flint, Mich., has been appointed a member of the Michigan state public utilities commission.

R. EMERSON SWART has resigned the presidency of the Community Water Service Co. to organize the firm of Swart, Brent & Co., Inc., of New York, which will specialize in water company securities.

M. S. BLAIKLOCK, assistant chief engineer of the Canadian National Railways, has retired after more than half a century of service. He will retain his position as chairman of the general cooperative committee of maintenance-of-way employees.

WESLEY WINANS HORNER, chief engineer, sewers and paving, St. Louis, Mo., has been engaged by Dallas, Tex., to make plans for outlet sewers on Mill Creek and Dallas Branch and to draw up a general drainage plan for the city.

O. H. KOCH, former member of the engineering firm of Koch & Fowler, has been appointed director of public works at Dallas, Tex. He will direct the departments of engineering, garbage removal and disposal, street maintenance and cleaning, motor equipment, construction, airport, sanitary sewerage and building inspection.

SOCIETY CALENDAR

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS, Washington; annual meeting, Sept. 28-Oct. 1, Salt Lake City.

AMERICAN PUBLIC HEALTH ASSOCIATION, New York; annual convention, Montreal, Sept. 14-17.

AMERICAN SOCIETY OF MUNICIPAL ENGINEERS, St. Louis; meeting, Oct. 19-26, Pittsburgh.

AMERICAN WELDING SOCIETY, New York City; fall meeting, Oct. 21-25, Boston.

INTERNATIONAL CITY MANAGERS ASSOCIATION, Chicago; annual meeting, Oct. 7-10, Louisville, Ky.

INTERNATIONAL ASSOCIATION OF PUBLIC WORKS OFFICIALS, Chicago; conference, Sept. 24-26, New York City.

NATIONAL MUNICIPAL LEAGUE, New York City; annual meeting, Nov. 9-11, Buffalo, N. Y.

NEW ENGLAND WATER WORKS ASSOCIATION, Boston; annual convention, Sept. 29-Oct. 2, Boston.

AMERICAN ASSOCIATION OF ENGINEERS will hold its 1931 convention in Huntington, W. Va., Sept. 28-30. M. E. McIver, 8 South Michigan Ave., Chicago, is secretary.

CAROLINAS DIVISION, Associated General Contractors of America, will hold its midwinter session in Charlotte, N. C., in December.

FIRST INTERNATIONAL CONGRESS of the New International Association for the Testing of Materials will be held Sept. 6-12 in Zurich, Switzerland. The association consists of individuals and companies in many countries, contacts in the United States being established through the American Society for Testing Materials. The objects of the association are to secure international cooperation and exchange of views and experience in regard to all matters connected with the testing of materials. The work does not involve standardization of materials.

UTAH SOCIETY OF ENGINEERS, at its annual meeting June 25, elected the following officers: president, Dr. Dorsey A. Lyon, of the engineering experiment station of the University of Utah; vice-presidents, C. C. Pratt and Fred Richardson; secretary, R. R. Woolley; treasurer, R. K. Brown.

Obituary

WILLIAM H. OLIVER, who retired several years ago as superintendent of construction for the U. S. treasury department, Washington, after serving 30 years, died on June 29 at the summer home of his son at Whitehall Beach, Md. Mr. Oliver was 81 years old.

JOHN C. SULLIVAN, formerly vice-president and general manager of the Flint Construction Co., of Palmer, Mass., died in Passaic, N. J., on June 30. Mr. Sullivan retired from active business in 1914, and had lived in Passaic since that time. He was 75 years old.

CHARLES D. FLEMING, senior vice-president of the Cleveland Tractor Co., died in Cleveland on July 1 after a lingering illness of three months. Since 1920 Mr. Fleming had served as an executive of the Cleveland Tractor Co., going to that city from Detroit, where he was assistant treasurer of the Studebaker Corporation for seven years. Previously he was associated with the Detroit Trust Co. Mr. Fleming was a member of the board of directors of the manufacturers' division of the American Road Builders' Association.

ROBERT M. CLAYTON, of Atlanta, Ga., died recently in that city at the age of 86. After serving in the Confederate army, Mr. Clayton was engaged as a civil engineer on railroad work and from 1875 to 1878 was superintendent of construction on the Augusta Canal. From 1885 to 1914 he was city engineer and chief of construction for the city of Atlanta and had charge of the construction of the present waterworks, sewerage system and sewage-disposal plants. Mr. Clayton was a member of the American Society of Civil Engineers and a past-president of the American Water Works Association.

JOSHUA ALEXANDER HATFIELD, president of the American Bridge Co., who was identified with the steel industry for more than 50 years, died in New York City on July 4. He was 68 years old. After leaving high school Mr. Hatfield became office boy for the Pottstown Iron Co., and later became general sales agent, serving until 1896. He became head of the sales force of the Pencoyd Iron Works in Philadelphia in 1897 and in 1898 removed to New York to act as the company's agent. He became assistant to the president in 1900 and was made president in 1901. In that year, when the United States Steel Corporation was organized, Mr. Hatfield became president of the American Bridge Company of New York and a director of the American Bridge Company of New Jersey, two of the Steel Corporation's subsidiaries. When the two bridge companies were consolidated in 1914, he became vice-president of the combined concern. In 1927 he was elected president.

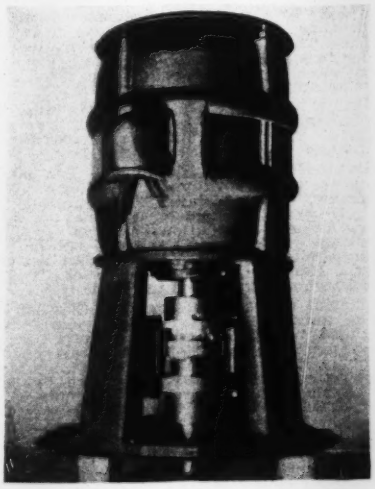
Construction Equipment and Materials

Coupling for Deep Well Pumps Permits Use of Solid Shafts

Present deep well pump practice requires the use of hollow shafting extending through the driving motor to permit vertical adjustment of the turbine pump rotor by means of a nut threaded on the extended end of the pump shaft. This necessity is now eliminated by incorporating the adjustment in a coupling designed by the Ideal Electric & Mfg. Co., Mansfield, Ohio. A further advantage of the new coupling is that it contains means for preventing the unscrewing of shaft sections by uncontrolled backspin. The latter feature is omitted when the coupling must take care of vertical thrust in two directions, as is required in some installations.

The new coupling also facilitates repairs. In the ordinary hollow shaft installation when the motor must be removed for pump maintenance or replacement it must be jacked up high enough to clear the end of the pump shaft, a distance of from 3 to 8 ft. During this operation great care must be taken to maintain alignment or the pump shaft will be sprung. With the new coupling the motor is raised only high enough to clear the coupling and base, a matter of a few inches. The new coupling also makes it possible to use any type of standard solid shaft vertical motor, including slipring, direct-current and synchronous motors which have not been used heretofore because of the mechanical difficulties involved in building hollow shaft units.

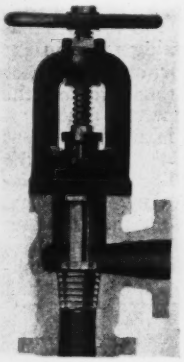
Elimination of shaft disconnection through backspin is taken care of in a novel manner. In operation, the lower sides of the pump rotors clear the pump bowls by a small fraction of an inch. When backspin occurs and a joint in the shaft starts to unscrew, the shaft lengthens. The result is that the lower end of the shaft drops until the pump rotors ride on the pump bowls. Further lengthening of the shaft causes the upper end to rise, disengaging the coupling and permitting the pump shaft to turn freely, thus preventing any further unscrewing. Thus the backspin release acts before any joint can unscrew far enough to come apart.



Vertical pump coupling

New Type of Valve Applicable to Many Uses

An entirely new principle of design developed by the Ludlow Valve Mfg. Co., Troy, N. Y., has enabled this company to produce what is termed the Multi-Valve, which has all features essential to performance as a blow-off valve, a throttle valve, a drain valve or a stop valve. It is particularly well adapted for use under high temperature and pressure conditions, and represents perhaps the first attempt to attack the problem of valve erosion through design rather than by the use of special materials. Erosion of a valve seat is due chiefly to high velocity and density of the fluid handled, and is most pronounced with a valve opening of less than 0.0001 in. Since every opening must increase in size from zero to full flow it naturally results that some erosion takes place whenever the valve is opened or closed. In the case of throttle valves, this condition is very pronounced in the simmering or cracked position.



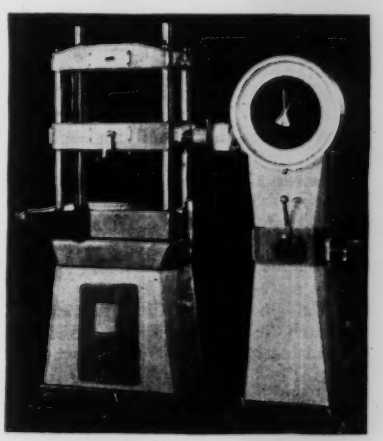
Multi-Valve

Reference to the illustration will show that the single seat of the ordinary valve is replaced by a multiple seat which acts to decrease the pressure step by step through proper control of expansion and back pressure. This gives a low pressure differential across a number of successive and independent seating contacts. Between these are expansion chambers in which pressure is relieved, density lowered and velocity reduced. This multi-stage plug or cone is the unusual part of the Multi-Valve. When free from its seat, this cone turns freely on the valve shaft, but when once engaged, its rotation ceases and the plug, as it moves to a tighter position, has a scraping action which serves to clean the seat and plug. With the plug free to rotate a new surface makes contact with each successive seating. It is stated that a valve of this type will remain tight without regrinding for long periods of service.

In any open position the plug remains suspended within the center of the vortex and is perfectly balanced, thus preventing chattering. When fully opened, the top of the cone bears against the bonnet cover, where it is out of the path of flow. The body of the valve is available in all conventional types for angle or straightaway installation, with either screw or flange connections. Remote control through power operation can readily be applied to the larger sizes.

Universal Testing Machine With Many New Features

Accuracy and sensitiveness, ease of operation, wide utility and excellent appearance are combined in a new precision hydraulic universal testing machine just announced by the Riehle Bros. Testing Machine Co., Philadelphia, Pa. Five sizes are available, with maximum capacities ranging from 60,000 to 400,000 lb. This machine is built in three units: loading, indicating and power. The loading unit has the customary upper and lower head with grips for tension testing. The upper head rests on four rods attached to the table, while the lower head is sustained by two large screws upon which are mounted bronze nuts rotated by a motor and worm drive, serving to move the head up or down for adjustment but not for testing. The table is supported on a ram, which, with its cylinder, is housed in the base casting. When hydraulic pressure is applied to the ram it lifts both table and upper head, subjecting the specimen to either tension or compression according to the position in which it is placed. No packing is used to hold the hydraulic pressure, as the ram and cylinder are ground to a precision fit. The slight leak of oil between these serves to reduce friction to a minimum and renders the hydraulic pressure a true measure of the load



Hydraulic testing machine

applied. The gripping mechanism is of the usual wedge type, modified so as to be engaged by horizontal, rather than vertical, motion. A new form of serration has been developed and all grips are machine-cut and heat-treated. Within the base of this unit a commodious storage space is available which serves to hold tools and other small equipment used in testing.

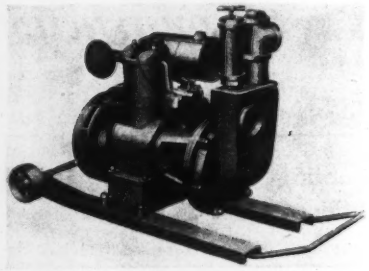
The indicating unit is perhaps the most unusual and distinctive feature of the machine. Pressure from the main cylinder is brought through a transfer valve and applied to either one or two plungers of the unpacked or floating type which are oscillated rapidly by an individual motor drive so that friction effects are entirely eliminated. The resulting effort, whether applied to one plunger alone or to both opposed, is counterbalanced by the buoyant effect of a steel float in a pool of mercury. A small motion of the float produces a relatively large change in the mercury level. With a single plunger working, the hydraulic pressure on its cross-section is sufficient to submerge the float to its full depth at one-fifth of the total capacity of the machine. With the two plungers working in opposition, however, it requires the full capacity pressure to submerge the float. This arrangement affords a simple and direct means of obtaining full-scale load indications either at full capacity or one-fifth capacity, as desired. Travel of the float is transmitted through a rack and pinion to a pointer moving across the face of a 20-in. dial marked for both full and fractional scales so that both are always available. Changing from one to the other involves only the manipulation of a transfer valve.

The indicating unit, in addition to its primary function, serves as a mounting for the necessary electrical and hydraulic controls. These include a pump control lever, a pushbutton control for the pump motor, a double throw switch for running the lower head up or down, a transfer valve and a knob for adjusting the dial pointer to zero.

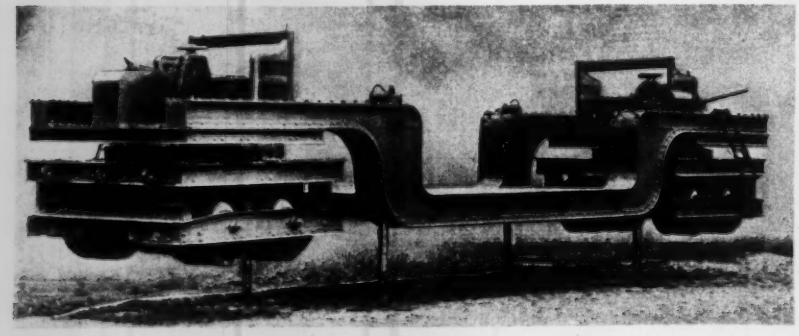
The power unit consists of a six-plunger variable stroke high-speed pump mounted in an oil tank driven by a constant speed motor through a chain transmission. Delivery is regulated by a cam which adjusts the stroke of the pump and also opens a discharge valve to permit the load plunger to return to its starting point. All oil is filtered to prevent the entrance of dirt into the system.

Self-Priming Centrifugal Pump

Automatic positive priming on suction lifts up to 29 ft. through the use of a built-in vacuum pump of the ejector type without valves, pistons, cams, chain drives or floats is the feature of a new 3-in. centrifugal pumping unit which has been announced by the Sterling Machinery Corp., 2303 Holmes St., Kansas City, Mo. Due to the fact that there are no reciprocating parts in the vacuum pump to wear out, the latter rotates continuously, thus priming the centrifugal pump whenever necessary. As the vacuum pump is an independent unit, it does not affect the design of the water pump. Long life and trouble-free performance when pumping dirty, gritty water is assured by the use of an extra-heavy semi-steel case or shell, a sand pump type impeller and a crank-case mounted in Timken roller bearings protected by a pump stuffingbox with a renewable bronze shaft sleeve. The capacity of the unit varies from more than 18,000 gal. per hour at 10-ft. head to 2,760 gal. at 90-ft. head. It is driven by a single-cylinder air-cooled four-cycle motor developing over 5 hp. at 1,800 r.p.m. Larger units of the same type in 4- and 6-in. sizes will shortly be announced.



Centrifugal pump with automatic priming



GERMAN TRAILER FITTED WITH JACKS

Both vertical and horizontal transportation is furnished for loads up to 70 tons by this unusual trailer constructed in Germany by the firm of Herman Rüter of Langenhagen. The body, consisting of two longitudinal I-beams with double flanges, is reinforced by four cross-members and a steel-plate floor. It is mounted upon two interchangeable swiveling trucks, each controlled by a steering wheel and each carrying eight wheels with dual tires, giving a total for the trailer of sixteen wheels and 32 tires. Wheels are mounted in pairs upon short axles carried by spiral springs, the axles oscillating to give even load distribution regardless of surface irregularities. Expanding brakes of the drum type are applied to several wheels of each truck. Loading or unloading is facilitated by four lifting jacks built into the body. These can raise body and load to the height of a railroad car, or just enough to permit the removal of the trucks, after which the body can be lowered to rest directly on the ground. The fact that both trucks can swivel to any angle makes it possible to maneuver the trailer easily in restricted space. For road transportation the rear truck is locked and the front truck left free to follow the lead of the tractor.

Business Notes

KEYSTONE PORTLAND CEMENT CO., Philadelphia, Pa., announces the appointment of Charles E. Shearer as assistant sales manager. Mr. Shearer was formerly associated with the Atlas Portland Cement Co. and the Pennsylvania-Dixie Cement Corp.

ATLAS IMPERIAL DIESEL ENGINE CO. announces the sale of a number of portable Atlas diesels to Six Companies, Inc., for use in driving air compressor units on the construction of the Hoover Dam. Atlas diesel power units are already in use on this project in the construction of a highway by J. L. LeTourneau.

LUKENWELD, INC., a division of the Lukens Steel Co., Coatesville, Pa., has appointed two new representatives: Dravo Doyle Co., Pittsburgh, Pa., and W. R. McDonough & Co., Cleveland, Ohio.

WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh, Pa., has elected J. S. Tritle vice-president in charge of manufacturing, sales and engineering.

WICKWIRE SPENCER SALES CORP. announces that R. E. Ratcliffe, representative in the Texas district, has been transferred to Tulsa, Okla., to take the place of Larence J. Baldwin, resigned. Robert Dougan, formerly connected with the Gulf Concrete Pipe Co., of Houston, Tex., has been made manager of the structural products department in the Tulsa district to take the place of J. M. Mercer, who has resigned to go into business in California as a member of the Curtis Whitney Steel Co.

COLAS ROADS INC., is the new name adopted by the organization formerly known as Flintkote Roads Inc., Boston, Mass. The alteration has been made in order to identify the name of the company more closely with its product, and does not involve any changes in organization.

UNION CHAIN & MFG. CO., Sandusky, Ohio, has appointed the Industrial Gear & Machine Works, Oakland, Calif., exclusive distributor for the western territory.

BLAW-KNOX CO., Pittsburgh, Pa., announces the appointment of Roger W. Andrews, now assistant to the president, as vice-president and a director of the Blaw-Knox International Corp. Mr. Andrews will reside in Paris and will be in charge of the company's European activities. He will take the place of C. T. Clack, who recently died in Germany.

EUCLID CRANE & HOIST CO., Cleveland, Ohio, announces that its name has been changed to Euclid-Armington Corp. The road machinery division of the old company will manufacture and sell earth-moving equipment under the name Euclid Road Machinery Co. of Euclid-Armington Corp. Officers of the road machinery company include the following: president and general manager, A. P. Armington; vice-president and general sales manager, W. G. Fleming; vice-president and works manager, H. J. Zimmerman; secretary and chief engineer, S. F. Armington. Officers and personnel of the Euclid-Armington Corporation remain the same as before the change.

CONSTRUCTION NEWS

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WATERWORKS

PROPOSED WORK

Calif., Anaheim—City purchasing deep well turbine pump, motor. Former bids rejected. Noted June 4.

Calif., San Francisco—S. J. Hester, secy. Bd. P. Wks., rein.-con. dam on Upper Alameda Creek, 10 mi. southeast of Sunol. $75,000.

Ind., Elwood—City Council, 55,000 gal. reservoir, 26 x 28 x 10 ft. tank. $20,000.

Mass., Chatham—Chatham Water Co., A. S. Dowing, in charge, 89 Broad St., Boston, pumping station, new waterworks. To exceed $15,000. Private plans.

N. J., Newark—North Jersey Dist. Water Supply Comn., 24 Commerce St., concrete dam at Split Rock Pond, Hibernia. $25,000 or more. Project in abeyance. Noted May 21.

N. J., Ridgewood—Bd. Village Comrs., 29 Hudson St., installing mains in Franklin Turnpike from Fairfield Ave. to Conklin Pl. $15,000. **Maturity soon.** R. A. Horton, 20 Hudson St., village engr.

O., Wickliffe—Village, legislation underway and takes bids after Aug. 1, main in 7 streets. To exceed $25,000. Sterling Eng. Co., 7016 Euclid Ave., Cleveland, engrs. Noted Jan. 8.

Texas—See "Power & Lighting."

BIDS ASKED

Calif., Beverly Hills—July 14, by City Clerk, furnishing, installing booster pumping plant at Melrose Plant.

Calif., Los Angeles—Bd. Supervs., Los Angeles Co, taking bids 200,000 gal. (or) 150,000 gal. tank, incl. piping, steel tower, hemispherical bottom, conical roof for water storage at Los Angeles County General Hospital.

Mass., Rockport—Town taking bids standpipe at Pigeon Hill. $25,000. Metcalf & Eddy, Statler Bldg., Boston, engrs. Noted Mar. 26.

Mass., Boston—July 17, by Metropolitan Dist. Water Supply System Comn., 20 Somerset St., stream control works at Main dam of Swift River Reservoir in Belchertown, Enfield and Ware, incl. excavating, lining 1,100 ft. rock tunnel and 1 shaft, excavating approach and outlet channels, constructing appurtenant works. F. E. Winsor, ch. engr. comn.

Mo., St. Louis—Bd. P. Serv., City Hall, taking bids altering and extending septic tank, new equipment at St. Louis Training School, Bellefontaine Rd., $10,000; 7,200 ft. 4 in. c.i. mains in Forest Park, both sides Wabash Ry. right-of-way.

Neb., Lincoln—T. H. Berg, city clk., taking bids four 25 x 80 ft. wells, along side Plate River, near Ashland and power line from Ashland to site of wells. $19,500.

N. Y., Brooklyn—July 14, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains, appurtenances in Glenwood Rd., Avenues H and J, Brooklyn and Sheridan Aves., Bergen, Catherine, Cooper, Pacific, President, Willoughby, and South 8th Sts.

N. Y., Newark—July 22, at office Dpt. Mental Hygiene, State Office Bldg., Albany, additional water supply at Newark State School. F. W. Parsons, comr.

O., Cleveland—July 10, by Bd. Comrs. Cuyahoga Co., mains, connections in Brookfield Ave. and vicinity. $25,000. W. J. Rogers, Ulmer Bldg., engr.

O., Cleveland—July 17, by Bd. Comrs. Cuyahoga Co., water mains in Merkle Ave., West 54th St. and Ridgewood Dr., Impvt. 199, $50,000. W. J. Rogers, Ulmer Bldg., engr.

Pa., Canonsburg—D. C. Morrow, engr. Citizens Water Co., 62 East Wheeling St., Washington, subsidiary Community Water Serv. Co., P. S. Wilson, supt. operations, 46 Cedar St., New York, taking invitational bids 200 m.g. impounding earth dam and concrete spillway, 550 cu.yd. concrete, 40,000 cu.yd. earth gates and c.i. piping, reserved by owner.

Tex., Brownsville—See "Contracts Awarded."

Tex., Corpus Christi—Aug. 10, by City, c/o Secretary, reconstructing La Fruta Dam, $417,000. H. E. Elrod & R. J. Cummings, 727 Bankers Mortgage Bldg., Houston, engr. L. C. Hill, 605 West 15th St., Los Angeles, Calif., consult. engrs. Noted Apr. 30.

Tex., Gladewater—City, c/o B. F. Phillips, mayor, taking bids waterworks improvements, incl. water well, pump house, some main extensions, $25,000. F. J. Von Zuben, Don Waggoner Bldg., Fort Worth, and Gladewater, engr. Noted June 25.

CONTRACTS AWARDED

Calif., Fairfield—L. Morrill, city clk., water distribution system, incl. 2- to 12-in. McWayne pipe, to Stroud Bros. & Seabrook, Union Ave., Bakersfield, $16,690; furnishing, installing 100,000 gal. elevated steel tank and tower, to Pittsburgh-Des Moines Steel Co., Rialto Bldg., San Francisco, $8,100; tank found., to F. H. Cress, 828 Excelsior Ave., Oakland, $675. Grand total $25,465. Noted June 4.

Conn., Hartford—Bd. Contr. & Supply, rein.-con. pumping station, flood protection in dike project, to C. W. Blakeslee & Sons, Inc., 58 Waverly St., New Haven, $82,374. Noted June 18.

Ill., Freeburg—City Council, 2.7 mi. pipe line from Silver Creek, surface reservoir, pumps, to F. M. Luth, 4135 Flora Blvd., St. Louis, Mo. Est. $23,000.

Ill., Mount Olive—City Council, furnishing 15,000 ft. 4 in. wrought steel (used) pipe, to Greenspons Sons, Iron & Steel Co., 3130 North Hall St., St. Louis, Mo., at $0.32 per ft. City will lay pipe with own forces.

Ill., Salem—Water treatment plant, to E. H. Bavenfinger & Son, Salem, $75,000. Noted June 5.

Mich., Detroit—Dpt. Water Supply, 735 Randolph St., superstructure, brick, steel, rein.-con., stone waterworks intake at head of Belle Isle, to Atkin & Stock, 14,915 Grand River Ave., $69,932. Noted Apr. 30.

Mo., St. Louis—For 7,200 ft. 4 in. c.i. mains on both sides Wabash Ry. right-of-way, Forest Park, to R. C. Micotto, 2516 Arlington Ave., $4,624.

N. Y., New York—Dpt. Water Supply Gas & Electricity, Municipal Bldg., steel and c.i. mains in Elton St., to A. Gregorio & Co., 1121 Niel Ave., $293,000. Noted June 18.

N. Y., St. George—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Katan and Lockman Aves., to Empire Contg. Co., 319 East 22nd St., $1,320. Noted June 18.

N. D., Grand Forks—City, 2 sump and 2 raw-water pumps for Water Dpt., to Worthington Pump & Mchy. Co., 1012 Pioneer Bldg., St. Paul, Minn., $3,813. Noted June 4.

O., North Canton (br. Canton)—For 275,000 gal. elevated steel water storage tank at Church St. and Rose Rd., to Pittsburgh Des Moines Steel Co., Neville Island, Pittsburgh, Pa., $25,000.

Pa., Lancaster—City Council, T. W. Metzger, mayor, 23,866 ft. 12- to 36-in. c.i. water lines, to A. Lucenti, 6101 Pennsylvania Ave., Pittsburgh, $216,649; steel stand pipe, 92 ft. high, 100 ft. diam., to McClintic-Marshall Co., Oliver Bldg., Pittsburgh, $65,870; concrete slab standpipe found., 5 ft. thick, 100 ft. diam., to D. W. Warfel, Lancaster, $22,368; painting old standpipe, to Tippett & Wood, Phillipsburg, N. J., $2,500; telemeter, to H. J. Pfenninger, Lancaster, $1,225. Grand total $308,612. Noted May 14.

S. D., Vermillion—University of South Dakota, laying, connecting watermains to buildings, placing fire hydrants, to Ellerman-McLain Co., Yankton, $6,570; furnishing, installing Permutit water softener, to Aberdeen Heating & Plumbing Co., Aberdeen, $1,993; constructing 1,250 ft. concrete pipe tunnel 6 x 6 ft. inside

Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue

Location	*Project*	*Cost*	*Status*
Bridges			
New York and New Jersey	Borings, traffic surveys	$10,000,000–$12,000,000	Proposed
Federal Government			
Seattle	Breakwater	1,500,000	Proposed
Memphis	Pile dikes	1,000,000	Contract
Cleveland (O.)	Post office	5,250,000	Proposed
Knoxville	Post office	1,575,000	Proposed
Sports and Parks			
Chicago	Stadium	1,000,000	Bids asked
Subways and Tunnels			
Philadelphia	Tunnel	1,000,000	Proposed
Grade Crossings			
Elizabeth (N. J.)	Grade crossings	14,000,000	Contract
Unclassified			
New York	Telephone construction	13,266,500	Proposed
Texas and Louisiana	Pipe line	1,350,000	Contract
Foreign			
Italy	Warehouses, refrigeration	4,000,000	Proposed
Factories and Mills			
San Jose (Calif.)	Cement plant	2,250,000	Contract
Chino (Calif.)	Dairy plant	1,000,000	Proposed
Cicero (Ill.)	Factory	1,000,000	Contract
Alameda (Calif.)	Glass factory	1,500,000	Proposed
Power Plants			
Winnipeg (Man.)	Power plant	1,000,000	Proposed
Buildings			
Nashville	Administration, auditorium, etc.	1,000,000	Proposed
Elizabeth (N. J.)	City hall	1,000,000	Proposed
New York	County	7,000,000	Bids asked
Bennington (Vt.)	Dormitories, library, etc.	1,000,000	Proposed
Brooklyn (N. Y.)	Hospital	1,000,000	Proposed
Brooklyn (N. Y.)	Hospital	1,625,000	Proposed
Brooklyn (N. Y.)	Hotel	1,250,000	Proposed
Brooklyn (N. Y.)	Hotel	1,500,000	Contract
Boston	Office	1,500,000	Proposed
Cambridge (Mass.)	High school	1,500,000	Proposed
Wash. (D. C.)	Theatre, mart, packing space, etc.	10,000,000	Proposed
San Francisco	Memorial Opera House	5,000,000	Bids asked

See proposal advertising on page 89

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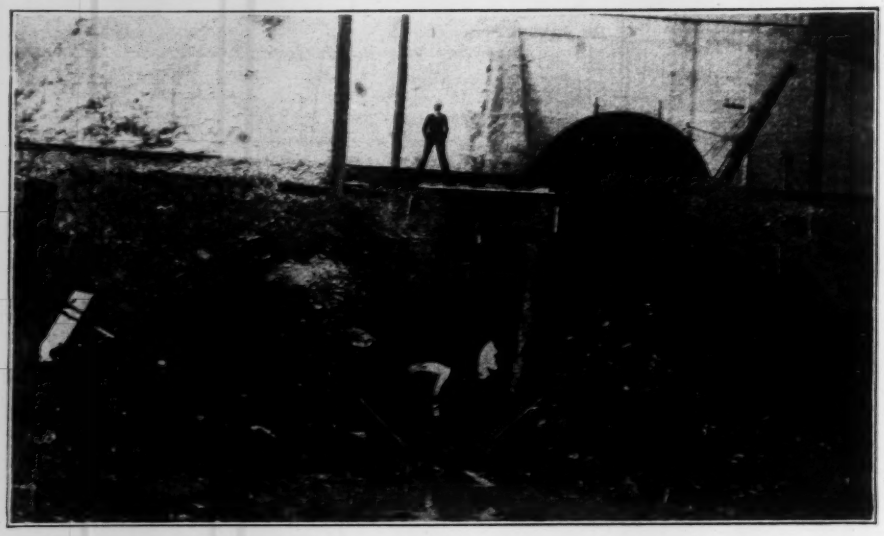
LEADITE

Trade Mark Registered U.S. Pat. Office



30 in. c.i. bell and spigot water main with LEADITE joints under R.R. tracks.

Under Railroad Tracks, too—

LEADITE, the Pioneer Self-caulking material for jointing bell and spigot pipe, —has been used under every condition known to water main construction, with great success, viz.:

Under Railroad Tracks; Below the Surface of Rivers and Lakes; Across Bridges; Under well paved streets; Across hilly and rocky country; Around sharp curves; Upon piling supports; In ditches beside car tracks; Through famous Parks and Private Estates, and across open country.

LEADITE, not only makes a good, tight joint, but has proven durable and permanent. Experience has demonstrated that LEADITE joints improve with age.

Thousands of miles of bell and spigot water mains are jointed with LEADITE, —and it is significant that LEADITE is used by many Water Works Men and Engineers as a standard for comparison.

LEADITE melts easily and pours freely. It is readily used in either the coldest or hottest climates.

The pioneer self-caulking material for c. i. pipe.
Tested and used for over 30 years.
Saves at least 75%

THE LEADITE COMPANY
Land Title Building, Philadelphia, Pa.

No Caulking

Waterworks (Continued)

with 5 and 6 in. walls, to Queen City Constr. Co., Sioux Falls, $12,750. Grand total $21,313.

Pa., Phila.—Dpt. P. Wks., Bureau Water, A. Murdock, dir., City Hall Annex. Contr. 1030, furnishing, delivering copper and fitting for pilot tubes Lardners Point Pumping Sta., to McHugh & Lucas, 20 South 15th St., $1,989. Noted June 19.

Tex., Brownsville—Waterworks improvements, incl. extending mains into outlying district and replacing mains, installing some equipment, own forces. $90,000. G. W. Rogers, city engr. Noted May 21.

Utah, Salt Lake City — City Comn., 5,710 lin.ft. 18 in. and 4,350 lin.ft. 16 in. steel welded pipe line collecting system from Artesian Basin to Collonwood Conduit, to Mullins & Wheeler, Salt Lake City, $32,353. Est. $50,000.

SEWERS

PROPOSED WORK

Calif., Artesia—City and Los Angeles Co. 5.42 mi. 6- to 15-in. vitr. and portions c.i. sewers in Adams, Jefferson, et al. Sts., Co. Impvt. 962. $95,000 (county to pay $15,000 of cost). Address County Engineer's Office, Los Angeles.

Ind., Bloomington—City Council Jordan River Sewer. $49,000. C. Carpenter, Bloomington, engr. Noted Apr. 16.

Kan., Wakeeney—Soon takes bids complete sewage disposal plant, auxiliary piping, sewers. E. T. Archer & Co., 609 New England Bldg., Kansas City, Mo., engrs.

Ky., Louisville—City, c/o Comrs. Sewerage, 400 Marion E. Taylor Bldg., 4,000 ft. 15- to 42-in. sewers, large sizes plain or rein.-con., 2 small sizes vitr. tile, manholes, connections in Garden Dr. and Lexington Rd. W. M. Kaye, 400 Marion E. Taylor Bldg., technical engr.

Neb., Omaha—Preliminary plans 9 ft. concrete sewer from 27th and Burt Sts. to Missouri River via 24th and Cumings Sts. $350,000. H. Beal, city engr.

N. J., Bernardsville — Boro Council sewage disposal plant. $300,000. Clyde Potts, 30 Church St., New York, archt. **Maturity probably in late fall.** Noted Apr. 16.

N. J., Fanwood—Boro, 23,758 lin.ft. 8- to 15-in. sanitary sewers. S. W. McAneny, boro clk.

N. J., Linden—Bd. City Council, City Hall, sewage disposal plant, pumping station. $25,000. Engineer not selected.

N. J., Long Branch—Long Branch Sewage Disposal Co., preliminary plans sewage disposal plant. $150,000. C. R. Potts, 30 Church St., New York, engr.

N. J., New Brunswick—Bd. City Comrs., City Hall, plans sewage disposal plant. $25,000 or more. **Maturity probably soon.** Engineer not selected.

N. J., North Bergen—Bd. Twp. Comrs., Township Hall, sanitary sewerage system in East Durham Sect. $25,000. R. Glenn, township engr.

Tex., Gladewater—City, c/o B. F. Phillips, mayor, soon takes bids sanitary sewer improvements, incl. sewer mains, service pumps, 19,000 lin.ft. alternate type pipe. $30,000. F. J. Von Zuben, Don Waggoner Bldg., Fort Worth, and Gladewater, engr. Noted June 25, under "Waterworks."

BIDS ASKED

Calif., Los Angeles—See "Materials."

Calif., Pasadena—July 15, by B. Chamberlain, city clk., furnishing rotary air compressor, horizontal gas pump, heavy duty type with timing gears, if any, between the power source and compressor, in connection with sewage disposal plant.

Ind., Chesterton—July 10, by Town Bd., 5,300 ft. 10- to 18-in. vitr. tile sewers. A. P. Milton, Gary, engr. Noted Aug. 14.

Ia., Greenfield—July 24, by C. L. Downing, town clk., 55,000 ft. 8- to 15-in. pipe, 178 manholes, 280 g.p.m. pump, sewage disposal plant, Imhoff tank trickling filters with revolving distributor, sludge beds each requiring 400 yd. concrete, 25,000 lb. reinforcing steel, 3,800 lb. structural steel, 10,000 ft. lumber, 1,848 tons filters stone. DeLay & DeVoe, Creston, civil engrs.

Ia., Sioux City—See "Excavation, Drainage, Irrigation, Levees, River and Harbor."

Ky., Louisville—July 16, by Commissioners of Sewerage, 400 Marion E. Taylor Bldg., Garden Drive Submain, 4,000 lin.ft. 15- to 42-in. larger sizes of plain or rein.-con. circular, 2 smaller sizes vitr. tile, in Garden Dr. and Lexington Rd. W. M. Kaye, 400 Marion E. Taylor Bldg., engr. Noted July 2.

Mass., Boston — July 10, by Dpt. P. Wks., J. A. Rourke, comr., sewerage works in Dorchester; July 13, in Brighton. $25,000.

Mich., Escanaba—July 22, by C. A. Anderson, city clk., brick, concrete sewage disposal plant building, with connections, outlet sewer. $35,000. Suhr, Berryman, Peterson & Suhr, 130 North Wells St., Chicago, Ill., engrs.

N. J., Little Falls—Twp. Comn., Municipal Bldg., bids about July 15, altering and enlarging sewage disposal plant, filter beds. $100,000. J. Boughton, city engr. Noted May 28.

N. Y., Brooklyn—July 15, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewers in Elmore Pl., 27th, East 87th, and Maple Sts.

N. Y., New York—July 17, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., sewers in Wickham, Griswold, Outlook, Bayshore, Ampere and Watt Aves.

Pa., Castle Shannon—July 14, by R. W. Hoffman, boro. secy., 10,900 lin.ft. 6 and 8 in. terra cotta and 50 lin.ft. 10 in. c.i. sewers, 45 manholes, 26 lampholes in Sewer Dist. 5, Vegerier Ramsey Co., 208 Bowman Bldg., Pittsburgh, engrs.

Pa., South Brownsville—July 13, by Boro, 7,578 lin.ft. 6- to 12-in. sanitary sewers, 21 manholes. Brownsville Eng. Co., 5 Snowden Bldg., Brownsville, engrs.

S. D., Sanator—July 20, by Bd. Charities & Corrections at office R. E. Woodworth, supt. State Sanitorium for Tuberculosis, sewage treatment plant, connecting sewers. A. A. Chenoweth, 320 Dalton Blk., Sioux Falls, engr.

Tex., Brownsville—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Los Angeles—Sanitary sewers in Verdun Ave. between 58th Pl. and 64th St. and portions of other streets and public places, Ordinances 69,679 and 69,299, to Gadzo & Gogo, 3236 Garden Ave., $61,809. Noted May 28.

Calif., Los Angeles—Sanitary sewers, storm drains, grading, vitr. clay house connection sewers, concrete guttering, Wilmington Blvd., between S and B Sts., and in portions other streets and public places, Ordinances 68,592 and 67,977, to Southern California Roads Co., 2235 East 25th St., $170,210.

Ia., Burlington—City Council, Hawkeye Extension Sewer, incl. double box sewer, removing stone arch sewer, also to Miller Constr. Co., Burlington. Est. $50,697. Same contractor awarded contract 6 in. concrete paving Osborn St., 4,761. Noted Apr. 16.

Md., Baltimore—Bd. Awards, furnishing, loading rein.-con. pipe embraced in Material Contr. 84, to Gray Concrete Co., Duncan Lane, $33,415.

Neb., Omaha—City, sewer in Dist. 1095, 22nd St., to Omaha Sewer Constr. Co., 301 Karbach Bldg., $58,287. Dist. Sewer 1104, to H. J. Petersen, 1119 South 35th Ave., $3,122.

N. J., Boonton — Bd. Sewerage, sewers, appurtenances, to Digby Constr. Co., 16 Court St., Brooklyn, N. Y., $172,640. Noted June 4.

N. J., Pleasantville — Bd. City Council, City Hall, sanitary sewerage system along Northfield front extension, to Seamon & Letzkus, Stone Harbor, $24,412.

N. Y., Marcellus—Village, sanitary sewerage system, disposal plant, to Street Bros., 921 East Hiawatha Blvd., Syracuse, $55,000.

O., Cleveland—City, Sect. 4 of Big Creek Intercepting Sewer, incl. 1,695 ft. 5 ft. Circular "E" brick sewers, to Rothfuss & Zullo, Brecksville, $32,666.

Pa., Allentown—Dpt. Street & P. Impvts., J. A. Holman, supt., Klines Island Sewage Treatment Plant, incl. Lunis tanks, dosing chamber, pump house, to Pittsburgh Constr. Co., Diamond Bldg., Pittsburgh.

R. I., Providence—Sewers in D'Estaing Rd. to W. A. Gammino, Inc., 250 Hartford Ave. $2,510: Althea and Aquidneck Sts. to J. Ambrose, 1098 Pontiac Ave., $1,956. Dante St., to A. Aiello, 60 Weybosset St., $628. Lydia St. to J. Capaldi, 47 Marietta St., $2,959. Sharon Walton and Jastram Sts., to P. Basile, 3 West St., $10,502. Grand total $18,555. Est. $25,000.

S. D., Watertown—Sewage disposal plant, to Gray Constr. Co., Watertown, $166,277. Noted June 11.

Tex., Brownsville—Improving sanitary sewerage system, incl. extension mains into outlying district, replacing mains, some work on disposal plant, own forces. $60,000. G. W. Rogers, city engr. Noted May 21, under "Waterworks."

WASTE DISPOSAL

PROPOSED WORK

Mich., Dearborn — City plans by J. I. Dise, McKerchey Bldg., Detroit, brick, steel, concrete garbage disposal plant, plain found., Greenfield Rd. and Detroit, Toledo & Ironton R.R. $800,000. Hubbell, Hartgering & Roth, 2640 Buhl Bldg., Detroit, engrs. Noted June 11.

N. Y., Brooklyn—Dpt. Hospitals, Municipal Bldg., New York, soon takes bids general contract incinerator, equipment for Coney Island Hospital, Ocean Parkway. G. M. McCabe, 96 5th Ave., New York, archt. Noted Jan. 8.

N. Y., Douglaston—Dpt. Sanitation, Municipal Bldg., New York, preliminary plans incinerator. To exceed $500,000.

N. Y., New York—Dpt. Sanitation, Municipal Bldg., New York, preliminary plans 2 incinerators, one at Cromwell Ave. and 150th St., other at 215th St. from 9th to 10th Aves. To exceed $500,000 each. Noted Jan. 15, 1930.

BRIDGES

PROPOSED WORK

Calif., Los Angeles—Bd. P. Wks., City Hall, bids early in August, 300 ft. rein.-con. girder type bridge, 2 edge shaped structures to widen, re-align roadway, Tunnel Station and San Fernando Rd. $35,000. M. Butler, City Hall, engr.

N. J., Clinton—Bd. Freeholders Hunterdon Co., Court House, Flemington, concrete, steel bridge at Halstead St. $25,000. W. E. Roberts, Court House, Flemington, co. engr. Noted May 7.

N. J., Vleitown — Bd. Freeholders Somerset Co., Court House, Somerville, steel, concrete bridge. $25,000. O. Smith, Court House, Somerville, co. engr.

New York and New Jersey—Port of New York Authority, 90 8th Ave., New York, buildings, traffic surveys for bridges from Tottenville, N. Y. to Keyport, N. J. $10,000,000-$12,000,000. **Maturity indefinite.**

Okla., Isabella — State Hy. Dpt., Oklahoma City, preliminary plans 8 span 146 ft. rein.-con. bridge, Major Co. $30,000. A. R. Losh, hy. engr.

Tex., Columbus—Colorado Co., 400 ft. rein.-con., steel bridge over Colorado River. $180,000. County Eng. Dpt., Richmond, engrs.

Tex., Junction—Kimble Co., revising plans 577 ft. rein.-con. bridge over Llano River, Copperas Creek, on Hy. 27. $65,000. Address County Eng. Dpt. or State Hy. Dpt.

Tex., Richmond—Fort Bend Co., 550 ft. rein.-con., steel bridge over Colorado River on Hy. 3, foot Walnut St. $250,000. Address Fort Bend Co. Eng. Dpt., Richmond, engrs.

Tex., San Antonio—City Engineers and commissioners, not considering bids to have been opened June 22, rein.-con. bridge over San Antonio River. $30,000. Contract deferred, may build in fall. I. Ewig, city engr. Noted June 10 Daily.

BIDS ASKED

California—July 15, by C. H. Purcell, engr. State Hy. Comn., Sacramento, repairing bridge, incl. replacing floor, replacements, addition to operating equipment, over Petaluma Creek at Green Point, Marin and Sonoma Counties constructing ten 41 ft. and two 40 ft. 9 in. span steel stringer bridge on steel pile bents over Fresno River, at Madera, Madera Co.

Calif., Sacramento—Bd. Comrs. Sacramento Co., H. Hall, clk., taking bids 190 ft. Redwood or Douglas fir timber bridge on Swanston Rd. C. Deterding, Jr., Sacramento, co. engr.

Illinois—July 15, by State Dpt. P. Wks. & Buildings, Div. Hys. Springfield, 25 ft. rein.-con. slab bridge, Route 20, Sect. GR-B Lake Co.—25 ft. rein.-con. slab bridge, Route 22, Sect. 23-RB—thirteen 33 ft. span rein.-con. girder bridge, retaining wall, Route 49, Sect. 144-H, both Cook Co.—raising, widening six 14 ft. and one 21 ft. span timber bridge, Route 78, Sect. 109-V-B Carroll Co.—one 33 ft. and two 37 ft. span rein.-con. girder bridge, Route 95, Sect. 122-V-B Fulton Co.—one 45 ft., one 50 ft. and two 35 ft. span rein.-con. girder bridge, 2 rein.-con. substructures, 12 ft. rein.-con. box culvert, Route 143, Sect. 105-B—one 150 ft. and one 100 ft. span steel superstructures, Route 143, Sect. 105-C, both Saline Co.—rein.-con. substructure, fifteen 43 ft. I-beam approach spans on concrete piles, Route 148, Sect. 120-B—100 ft. steel superstructure, Route 148, Sect. 120-C, both Jefferson Co.—three 50 ft. span rein.-con. substructure, 5 rein.-con. girder approach spans, two 30 ft. span concrete substructure, two 30 ft. rein.-con. girder approach spans, Route 150, Sect. 133-B—one 115 ft. and one 80 ft. steel superstructures, Route 150, Sect. 133-C, both Alexander Co. F. T. Sheets, ch. engr.

Indiana and Kentucky—July 15, by State Hy. Comn., Indianapolis, Ohio River Bridge from Evansville, Ind. to Henderson, Ky., Contr. 6, two structures (41-A-876 and 41-A-877) each, incl. five 40 ft. spans, 973 cu.yd. Class D and 3,304 cu.yd. Class E concrete, 38,640 lin.ft. untreated timber piling, 546,280 lb. reinforcing steel; Contr. 7, Structure 41-A-878, incl. twenty-four 40 ft. spans, solid counterfort wall type rein.-con. bents and abutments on timber piles rein.-con. deck girder superstructure, and Structure 41-A-879, 24 ft. span spandrel filled rein.-con. arch bridge, 2,403 cu.yd. D and 3,655 E concrete, 36,340 lin.ft. untreated timber piling, 970,403 lb. reinforcing steel, U. S. Rd. 41, near Evansville, Ind. J. J. Brown, dir.

Kentucky—See "Streets and Roads."

New Jersey—Joint Bd. City Comrs. Asbury Park and Ocean Grove, City Hall, Asbury Park, bids about Aug. 1, 2 steel timber, concrete bridges over Wesley Lake at Emory St. and Heck Ave. $70,000. M. Rogers, 418 Monmouth Ave., Bradley Beach, engr. Noted June 11.

Pa., Pittsburgh—July 21, by Bd. Comrs. Allegheny Co., superstructure 4 span 1,575 ft., concrete, steel bridge, channel span 275 ft. long, South 10th St. $790,000. V. R. Covell, County Bldg., engr.

Wisconsin—July 14 by State Hy. Comn. and Hy. Com. Vernon Co., LaCrosse, Readstown Bridge, S. T. H. 11, F. A. P. 422-B, Vernon Co.

Ont., Toronto—City, bids about July 11, 200 ft. steel girder span bridge on concrete abutments, 55 ft. wide over Don River, Keating St. $150,000. R. C. Harris, city engr. Noted May 7.

CONTRACTS AWARDED

Calif., Los Angeles—Bd. Supervs., Los Angeles Co., 13 span, 250 ft. concrete, steel bridge 60.5 tons structural steel bracing, 177,296 lb. reinforcing steel, 12,941 lb. iron castings over Los Angeles River, on Vernon-Downey Rd. to Lynch-Cannon Eng. Co., 1027 Chapman Bldg., $56,706. Noted June 11.

Calif., Ukiah—State Hy. Comn., Sacramento, bridge, incl. two 125 ft. timber truss and eight 19 ft. timber trestle spans, grading bituminous treated crushed gravel surfacing 170 ft. roadway approaches over Russian River, Mendocino Co., near here, to E. T. Howe, Santa Rosa, $29,725. Noted June 11.

Illinois—Dpt. P. Wks. & Buildings, Springfield, bridges in DuPage Co., to Strandberg Bros. Co., 608 South Dearborn St., Chicago, $60,970—Winnebago Co., to J. T. Walbridge Eng. Co., 1014 South Michigan Ave., Chicago, $41,336.

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Bridges (Continued)

Effingham Co., to H. R. Cawood, Mount Vernon, $56,578—Cumberland and Madison Counties, to Casey Constr. Co., Casey, $41,074 and $25,287 respectively—Cook Co., to L. B. Fugitt Constr. Co., 703 North Michigan Ave., Chicago, $42,705—Cumberland Co., to International Steel & Iron Co., Evansville, Ind., $8,555—Effingham Co., to Vincennes Bridge Co., Vincennes, Ind., $8,997—Cook Co., to Steven Urich, Chicago, $25,770—2 bridges in Cook Co., to Acme Eng. Co., Chicago, $9,783 and $10,799 respectively. Grand total $331,854.

Indiana and Kentucky — Louisville & Nashville R.R. Co., 10th St. and Bway., Louisville, Ky., W. H. Courtenay, ch. engr., superstructure of river spans of bridge over Ohio River at Henderson, Ky., and constructing approach on Indiana side of river, incl. 20,000 tons structural steel, to American Bridge Co., South La Salle St., Chicago, Ill.; constructing approach on Kentucky side of river, to Virginia Bridge & Iron Co., Roanoke, Va. Noted Feb. 12.

Iowa—State Hy. Comn., Ames, 50 x 24 ft. I-beam bridge, 74 culverts, extensions, Marion Co., to Forgie & Groth, Sioux Center, $30,700—3 culverts, and 9 culverts, extensions, Delaware Co., to Schaaf & Jacobson, Lake Park, $1,180 and $2,080 respectively—71 culverts, extensions, Jackson Co., and 39 Culverts, Jackson and Clinton Counties, to J. B. Elliott, Independence, $49,850 and $39,844 respectively—100 x 20 ft. pony truss bridge with eight 50 x 20 ft. I-beam approach spans, 100 x 20 ft. skew pony truss bridge, raising, widening two 20 x 18 ft. I-beam bridges, Clay Co., to C. A. Holvik, $49,776—5 culverts, Bremer Co., to A. Willis, Shell Rock, $817—53 culverts, extensions, Madison Co., to C. W. Aikin, Atlantic, $8,354—26 culverts, extensions, Marion Co., to F. E. Stoops, Ames, $11,588—5 culverts, Johnson Co., to G. J. Chadek, Iowa City, $2,471—19 culverts, extensions, Dallas Co., to G. W. Boltz, Des Moinès, $4,345—1 culvert, Fremont Co., to W. E. Carlson, Essex, $1,134—5 culverts, Emmet Co., to Hildebrand & Kragh, Belmond, $3,370—3 culverts, extensions, Linn Co., to W. Denny, West Liberty, $1,148—overhead grade crossing, incl. three 38 x 24 ft. I-beams with two 23 x 24 ft. I-beam approach spans, Linn Co., to A. Melberg, Cedar Rapids, $14,000—overhead crossing, incl. three 50 x 24 ft. spans, Delaware Co. to A. Olson Constr. Co., Waterloo, $12,046. Grand total $254,703.

Maine—State Hy. Dpt., Augusta, to Naugler Bros. Co., Inc., Brunswick, bridge over Presumpscot River, Windham and Horman, 1,200 cu.yd. concrete $33,718; Creamery Bridge over Bear Brook, Charlestown, 208 cu.yd. concrete $5,053; sub-structure bridge over Wilson Stream, Willimantic, 240 cu.yd. concrete, $3,900—to Standard Eng. & Contg. Co., 2463 Broadway, Todelo, O., superstructure for same bridge, 101,300 lb. steel, $6,179; superstructure for bridge over Sebasticook River, Palmyra, 286,000 lb. steel, $16,154—to Kennebec Constr. Corp., Waterville, substructure and floor for same bridge, 400 cu.yd. concrete, $12,216—to R. W. Booker Co., Inc., 250 Stuart St., Boston, Mass., substructure Walker Bridge over Saco River, Fryeburg, 1,029 cu.yd. concrete, $22,946—to Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa., superstructure for same bridge, 506,000 lb. steel, $27,846; to Boone & Brewer Constr. Co., Presque Isle, Soucy Bridge, Grand Isle, 186 cu.yd. concrete, $4,724—to J. P. McCabe, 509 1st St., South Boston, Mass., Maine St. Bridge over Fish River, Fort Kent, 600 cu.yd. concrete $12,227—to Tide Water Constr. Co., Yarmouth, Jim Brown Bridge, Codyville, 205 cu.yd. concrete, $5,424; Davis Bridge, Jefferson, 117 cu.yd. concrete, $3,687—to Kerr & Houston, 142 High St., Portland, Wiscasset-Edgecomb Bridge over Sheepscot River, Wiscasset and Edgecomb, 634,000 B M creosoted timber, 90,400 lin.ft. creosoted piles, 1,959,000 lb. structural steel, 21,000 lb. machinery, $231,637—to Reed & Reed, Woolwich, bridge over Mill Brook, Newcastle, 151 cu.yd. concrete, $5,601; bridge over Deer Meadow Brook, Newcastle, 86 cu.yd. concrete, $3,305—to Wyman & Simpson, Inc., Augusta, bridge over Little Medomak River, Washington, 225 cu.yd. concrete, $4,752; bridge over Medomak River, Washington and Union, 389 cu.yd. concrete $10,401. Grand total $439,770. Noted June 11.

Minnesota — State Hy. Dpt., St. Paul, to Minneapolis Bridge Co., 701 Metropolitan Life Bldg., Minneapolis, constructing Bridge Co. 5106, $5,100; Bridge 5110 $14,145, both St. Louis Co.; Bridge 5111 Wright Co. $15,000—to M. E. Souther, 1528 East Branston St., St. Paul, Bridge 5107, St. Louis Co., $9,520—to Peppard & Fulton, 1004 Roanoke Bldg., Minneapolis, Bridge 5108, St. Louis Co., $13,020—to J. Leck Co., 211 South 11th St., Minneapolis, Bridge 5109, St. Louis Co. $18,169—to Nolan Bros. & Erler, 18 North 2nd St., Minneapolis, Bridge 5119 near Granite Falls, $10,114. Grand total $85,068. Noted June 4.

N. H., Bartlett — State Hy. Dpt., Concord, 2 span, rein.-con., steel bridge, to Kittredge Bridge Co., Concord, $35,769.

N. Y., Long Island City—A. Goldman, comr. Plant & Structures, Municipal Bldg., New York, reconstructing center pier fender Grand St. Bridge over Newtown Creek, to J. Rich Steers, 17 Battery Pl., New York, $20,750. Noted June 18.

N. Y., New York—A. Goldman, comr. Plant & Structures, Municipal Bldg., partial reconstructing center pier fender McCombs Dam Bridge over Harlem River, to A. M. Hazell, Inc., 26 Courtlandt St., $29,873. Noted June 18.

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Okla., Tula—City Comrs., E. Logan, clk., eighteen 86 ft. span concrete bridge over Arkansas River at 21st St., to Rucks-Brandt Constr. Co., 1525 Thompson Bldg., $308,857. Est. $388,572. Noted May 14.

Pa., McKees Rocks—R. G. Woodside, controller Allegheny Co., at Pittsburgh, McKees Rocks Bridge, North Side, utility houses and additional pylon work, to H. Wimer, Keystone Bldg., $14,000; sculptural work, to F. Vitor, 1820 5th Ave., $13,900. Noted June 19.

Texas—G. Gilchrist, state hy. engr., Austin, rein.-con. bridges Pecos Co., to D. H. Buchanan Constr. Co., 919 North 12th St., Temple, $34,547 est. $60,000—6 rein.-con., steel bridges, Presidio Co., to C. W. Gilfillan, Norwood Bldg., Austin, $37,887 est. $40,000—2 rein.-on. bridges Fisher Co. to Grouch & Noland, Strawn, $24,456 est. $30,000—8 span, rein.-con. deck girder bridge, Tarrant Co., and rein.-con. deck girder span bridge, Smith and Van Zandt Counties, to Purvis & Bertram, Fort Worth, $23,468 and $330,538 respectively est. $30,000 and $40,000 respectively—15 deck girder, rein.-con. bridge, Tarrant Co., to J. F. Buckner, 407 North Main St., Cleburne, $151,633 est. $180,000—2 deck girder, steel, concrete overpass, approaches, on Hy. 7, and rein-con., steel overpass on Hy. 31, both McLennan Co., to J. E. Johnson Constr. Co., Waco, $30,046 and $31,285 respectively est. $40,000 each—steel, concrete bridge, Brazos and Burleson Counties, to Missouri Valley Bridge & Iron Co., Box 921, Dallas, $289,633 est. $300,000—4 steel, concrete, deck girder span bridges and 1 culvert, Kerr Co., to Word & Worrell, Itasca, $47,541 est. $50,000—rein.-con., timber pile trestle bridges, Houston Co., to E. Pettus, Mongomery, Ala., $31,834 est. $44,000—steel, concrete bridge, concrete piers, treated timber spans, concrete flooring, incl. sixty-seven 15 ft. treated timber, two 40 ft. steel I-beam and one 150 ft. steel truss spans, 20 ft. roadway, Victoria Co., to J. DePuy, 1035 Milam Bldg., San Antonio, $52,198 est. $50,000—eight 50 ft. I-beam, span and one 130 ft. steel truss span bridge Mason Co., to Cage Bros., Bishop, $48,985 est. $50,000. Grand total $834,051. Noted June 11 and 18.

Ontario—Canadian Pacific Ry., J. M. R. Fairbairn, ch. engr., Windsor St. Sta., Montreal, Que., replacing bridges, steel work on 26 bridges on main line between Toronto and Windsor, to Hamilton Bridge Co. Ltd., Bay St. N., Hamilton, and to Canadian Bridge Co. Ltd., Walker Rd., Walkerville. Est. $500,000.

STREETS AND ROADS

BIDS ASKED

California—July 22, by C. H. Purcell, engr. State Hy. Comn., Sacramento, grading, untreated crushed gravel or stone surfacing 5.1 mi. road between Crescent City and point 0.5 mi. east of Elk Valley, Del Norte Co.—grading 10.2 mi., bituminous treated crushed gravel or stone surfacing 1.5 mi., widening, bituminous treated crushed gravel or stone borders 8.7 mi. road between South Scotia Bridge and Fortuna, Humboldt Co.—widening with bituminous treated crushed gravel or stone borders 6.6 mi. road between Shasta Union School and point 6 mi. north, Butte Co.—gravel surfacing 12.3 mi. road between Abbott Mine and point 12 mi. west of Williams, Lake and Colusa Counties—crusher run borders on 9.6 mi. road between Gaviota and Tecolote Creek, Santa Barbara Co.

Calif., Berkeley—July 16, by Regents of University of California, widening, paving, curbing, walks Fulton St. and Bancroft Way through University Campus. $30,000.

Calif., Red Bluff—July 15, by Bd. Directors Joint Hy. Dist. 18, Court House, armor type asphaltic oil surfacing 4 mi. road, 20 ft., from Gerber to Los Molinas, Tehama Co.

Calif., San Francisco — July 15, by S. J. Hester, secy. Bd. P. Wks., curbing, sidewalks, 1½ in. asphalt, 1½ in. asphalt binder with Class E base paving 230,000 sq.ft. Sect. C Alamany Blvd. from Seneca St. to Naglee Ave.

Idaho, Boise—Bids about July 15, concrete guttering 40,000 lin.yd. $35,000-$40,000. Address City Engineer.

Illinois—July 15, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, concrete, bituminous filled brick on concrete, or bituminous concrete (fine or coarse graded aggregate type) on concrete paving 0.33 mi. Route 5, Sect. 6-S, Dist. 1 Cook and Du Page Counties—0.77 mi. Route 18, Sect. 7R-1—3.14 mi. Route 19, Sect. 86-Y—2.92 mi. Route 19, Sect. 88-Y—1 mi. Route 46, Sect. 464-M-Y—0.5 mi. Route 49, Sect. 146-X, all Dist. 1, Cook Co.—4.1 mi. Route 53, Sect. 533—0.73 mi. Route 54, Sect. 544-X, both Dist. 1, DuPage Co.—2.4 mi. Route 127, Sect. 103, Dist. 8, Montgomery Co.—3.53 mi. Route 150, Sect. 134—3.38 mi. Route 150, Sect. 135, both Dist. 9, Alexander Co.—grading, drainage structures 0.36 mi. Route 18, Sect. 8-V-A, Dist. 1, Cook Co.—7.86 mi. Route 104, Sect. 121-A, Dist. 6, Brown Co.—7.95 mi. Route 104, Sect. 122-A, Dist. 6, Brown and Pike Counties—3.02 mi. Route 143, Sect. 105-A, Dist. 9, Saline Co.—10.66 mi. Route 148, Sect. 120-A, Dist. 7, Jefferson Co.—2.32 mi. Route 150, Sect. 133-A, Dist. 9, Alexander Co. F. T. Sheets, ch. engr.

Indiana—July 21, by State Hy. Comn., Indianapolis, concrete, bituminous concrete or brick paving 0.797 mi. State Rd. 2, Project 138 A1, Lake Co.—3.491 mi. State Rd. 50, F.A. 151C-F.A. 153, Ripley Co.—0.759 mi. State Rd. 50, Project 151D, Jennings Co.—3.156 mi. Project 154-224, Tippecanoe Co.—16.301 mi. State Rd. 6, F.A. 209B, Marshall and Elkhart Counties—8.786 mi. State Rd. 6, F.A. 210A, Kosciusko and Elkhart Counties—0.88 mi. F.A. 263, Marion Co.—grading 4.338 mi. State Rd. 64, Project 223A, Gibson Co.—0.809 mi. State Rd. 150, Project 227B. J. J. Brown, dir.

Ia., Riverside—July 17, by H. E. Doud, town clk., curbing, guttering, 7 in. rein.-con., 6 in. compress concrete or 2 in. bituminous macadam paving 7,000 sq.yd. H. R. Green Co., 208-210 Bever Bldg., Cedar Rapids, engrs.

Kansas—July 17, by State Hy. Comn., Court House, McPherson, bituminous blotter treating 15.8 mi. Project 50N-18, Kansas Project 7469 McPherson Co.—sand gravel surfacing 12.5 mi. Project 15-20, Kansas Project 7470—16.85 mi. Project 15-19, Kansas Project 7471, both Clay Co. W. V. Buck, Court House, Topeka, hy. engr.

Kentucky—July 28, by State Hy. Dpt., Frankfort, grading, drainage structures 6 mi. Bowling Green-Honakers Ferry Rd., Warren Co.; trestle approach and reconstructing existing steel span over Clarks River on Murray-New Concord Rd., near Murray, Calloway Co. B. Johnson, chn.

Louisiana—July 14, by State Hy. Comn., Baton Rouge, grading, surface treating 1.1 mi. approaches Industrial Canal Bridge, New Orleans-Chef Menteur Hy., Dist. 4505-B, Orleans Parish. H. B. Henderlite, hy. engr.

Maryland—July 14, by State Roads Comn., Baltimore, G. C. Uhl, chn., concrete paving 2.02 mi. Contr. B-188-44, Baltimore Co.—1.3 mi. Contr. H-128-42, Harford Co. and Contr. B-209-42 Baltimore Co.—0.75 mi. Contr. M-100-52, Montgomery Co.—1.2 mi. Contr. Wi-78-17, Wicomico Co.—gravel surfacing 1.9 mi. Contr. C-51-82, Calvert Co.—penetration macadam resurfacing 2.13 mi. Contr. Cl-51-82, Carroll Co.—macadam paving 0.83 mi. Contr. H-125-42, Harford Co.; adv. E.N.-R. July 9.

Massachusetts—July 17, by Metropolitan Dist. Water Supply Comn., bituminous macadam paving 5.2 mi. hy. and rein.-con. girder bridge, other appurtenant structures, Ware and Belchertown. Metropolitan Dist. Comn., 20 Somerset St., Boston, engrs.

Mass., Newton—July 14, by City, P. Wks. Dpt., grading, reconstructing Common Ave., Walnut and Homer Sts. $25,000 or more.

Minnesota—July 21, by State Hy. Dpt., St. Paul, grading, culverts 16 mi. State Project 4-49, Sects. 2 and 3 Sect.—5.8 mi. S.P. 7-27, Sect. 4—3.8 mi. S.P. 9-30, Sect. 4—3.8 mi. S.P. 59-26—5 mi. S.P. 14-26, Sect. 2.

Miss., Greenville—July 13, by Hy. Comn., gravel surfacing 2.96 mi. road near Glen Allen. Mississippi Levee Comn., Greenville, engrs.

Mo., St. Louis—July 21, by Bd. P. Wks., City Hall, widening, recut granite paving 6,100 sq.yd. 7th St., $41,400—8,260 sq.yd. 12th Blvd., $66,560—vibrolithic concrete paving 4,180 sq.yd. Hickory St.; $19,400—asphaltic concrete paving 1,100 sq.yd. Park Lane, $7,120—2,250 sq.yd. Edelle Ave., $14,240. W. W. Horner, city engr.

New Jersey — July 22, by Bd. Freeholders Monmouth Co., Court House, Freehold, grading, 9 in. concrete paving 89,886 sq.yd. Route 35, Sect. 8, Belmar to Brielle. C. E. Cole, clk.; adv. E. N.-R. July 9.

N. J., East Orange—July 27, by City Council, City Hall, 2 in. National, 2 in. Warrenite bithulitic or 3 in. sheet asphalt on 6 in. concrete paving Burchard Ave. from Brighton to Midland Aves. $25,000. E. Willergerod, city engr.

N. J., South Orange—July 10, by Bd. Village Trustees, Village Hall, sheet asphalt on concrete paving Center St. $25,000 or more. I. Redfern, village engr.

New York — July 21, by J. Downer, engr. Westchester Co., Court House, White Plains, grading, 8 in. rein.-con. paving 7,330 cu.yd. Poundridge Rd., Bedford and Poundridge, Co. Rd. 103; adv. E. N.-R. July 9.

N. Y., Brooklyn—July 15, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, grading, 6 in. granite block on concrete paving North 1st St., Lindee Blvd., Beverly and Quentin Rds., Avenues J and P, Alabama, Belmont, Flatlands, Franklin, 24th Aves., Dean, East 31st, East 35th, East 45th, East 46th, East 49th, East 96th, McKibben, North 5th, North 9th, 95th Sts.

N. Y., Hudson—July 13, by Comn. P. Wks., at office F. A. Gaffney, secy., City Hall, concrete paving Worth and Storm Aves., Union, Cross, North 6th, Short, Prospect, Franklin, Frederick and Dodge Sts.

N. Y., New York—July 13, by S. Levy, pres. Manhattan Boro, Municipal Bldg., grading, curbing, flagging, retaining walls, parapets, benches, fountains, granite block on concrete paving Allen and Broome Sts.; constructing Sect. 1, Div. 2, 12th Ave., Marginal St. and Thomas Smith Park from West 22nd to West 38th Sts.

N. Y., New York—July 16, by S. Levy, pres. Manhattan Boro, Municipal Bldg., sheet asphalt on concrete repaving Columbus Ave. and East 111th St.

N. Y., New York—July 17, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., grading, curbing, sidewalks, sheet asphalt on concrete paving Fielston Rd., Manning St., Bronx River, Wilkinson, Seymour, Arthur, Havemeyer and Quimby Aves.—grading, surbing, sidewalks, approaches, granite block on concrete paving Exterior St.—grading, draining, culverts Middletown Rd. and Pelham Parkway.

N. Y., Orangeburg—July 22, by Dpt. Mental Hygiene, State Office Bldg., Albany, roads at Rockland State Hospital, Contr. 2. F. W. Parson, comr.

Streets and Roads (Continued)

N. Y., Poughkeepsie—July 15, by Taconic Park Comn., 25 Market St., Poughkeepsie, grading, drainage and minor structures Sect. 1, Part 3, Eastern State Parkway, in Putnam Valley, Putnam Co. J. W. Bradner, Jr., ch. engr.; adv. E.N.-R. July 9.

N. Y., St. George—July 15, by J. A. Lynch, pres. Richmond Boro, Boro Hall, grading, curbing, brick guttering, bituminous macadam paving Genesee and Ridgewood Aves.

N. Y., Yorktown—July 20, by Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, grading, one course concrete paving 24,500 cu.yd. Bronx Parkway Extension from Croton Lake to Crompond Rd. J. Downer, Bronxville, ch. engr.; adv. E. N.-R. July 9.

Ohio—O. W. Merrell, dir. hys. Columbus, cancelled bids to have been opened June 19, concrete or waterbound macadam widening 4.71 mi. Sect. "A" and "B" Findlay-Kenton Rd., Hancock Co., $38,906; also rejected bids concrete or waterbound macadam paving 6.367 mi. Sects. "K," "L," "L-2" and "M" Cincinnati-Zanesville Rd., Muskingum Co., $53,668. Will readvertise. Noted June 15.

Ohio—O. W. Merrell, dir. hys., Columbus, received no bids June 19 concrete and bituminous macadam widening 3.22 mi. Sect. "M2" Cincinnati-Zanesville Rd., Project 188, Muskingum Co., $30,593. Will readvertise. Noted June 18.

O., Dayton—City Comn. rejected bids sheet asphalt on concrete paving 14,000 sq.yd. Patterson Blvd. from Jefferson to Stout Sts. $90,000. Will readvertise. J. F. Hale, city engr.

Pa., Phila.—July 14, by Bureau Hys., Dpt. P. Wks., City Hall Annex, A. Murdock, dir. Schedule A, grading 11th St. from Tabor to Clarkson Sts. — Schedule B, asphalt paving (assessment work) Mayland St. from 75th Ave. to Chelthan St.—Schedule C, asphalt repaving Walnut St. from 22nd to 24th Sts. and 20th St. from McKean to Mifflin Sts.

Virginia—July 15, by Dpt. Hys., State Office Bldg., Richmond, grading, macadam or gravel surfacing 0.6 mi. Route 715, Project S-686-A, Albemarle Co.

Wash., Seattle—Bd. P. Wks. bids about July 13, concrete paving Bright St., 6th Ave. N.W. et al. $47,238. R. H. Thomson, city engr.

Wash., Seattle—Aug. 3, by Comrs. King Co., Court House, concrete widening 6,100 sq.yd. East 65th St. from 20th N.E. to 35th N.E. Sts. T. D. Hunt, Seattle, co. engr.

Wash., Yakima—Comrs. Yakima Co., Court House, rejected bids June 17, concrete paving Selah-Gore Rd. $73,700. Will readvertise. O. E. Brashears, Yakima, engr. Noted May 21.

Wisconsin—July 17, by State Hy. Comn. and Hy. Coms. Grant and Iowa Counties, Lancaster, grading, graveling 872 cu.yd. Cassville-North Andover Rd., Grant Co.—grading, bridging, mine tail surfacing 600 cu.yd. Platteville-Dickeyville Rd., U. S. Hy. 118, both Grant Co.—grading, bridging 8.025 mi. Dodgeville-Lone Rock Rd., Iowa Co.—grading 0.16 mi. Hoadley Hill Rd., Grant Co.

CONTRACTS AWARDED

Arizona — State Hy. Comn., Phoenix, oil processing 6.5 mi. Safford-State Line Hy., Federal Aid Project 88-C and State Aid Project 13, Graham Co., to Martin Bros. Trucking Co., 1389 Gladys Ave., Long Beach, Calif., $21,896.

Arizona—State Hy. Comn., Phoenix, grading, oil processing (road mix method) Holbrook-Winslow Hy., F. A. P. 40-B and C, to W. E. Callahan Constr. Co., 708 Kirby Bldg., Dallas, Tex., $48,504. Noted June 18.

California — State Hy. Comn., Sacramento, bituminous treated gravel surfacing 8.4 mi. Humboldt Co., to Hemstreet & Bell, Marysville, $64,908—grading, screened gravel surfacing and timber bridge, Mendocino Co., to P. McHugh, San Francisco, $67,631—bituminous on crushed rock surfacing 20 mi., Placer and Nevada Counties, to C. W. Wood, Stockton, $66,380. Grand total $198,919. Noted June 19.

California—C. H. Purcell, engr. State Hy. Comn., Sacramento, bituminous treated surfacing 32 mi. roads in Trinity Co., 15-18 ft., to Heafey-Moore Co., Oakland, $61,223—bituminous treated crushed gravel or stone surfacing 8.8 mi. Nevada Co., 20 and 24 ft., to Tieslau Bros., Berkeley, $104,164—4 mi. Mono Co., 20 ft., to Southwest Paving Co., Washington Bldg., Los Angeles $84,619—grading, concrete surfacing 4 mi. Colusa Co., 20 and 36 ft., to Union Paving Co., Call Bldg., San Francisco, $124,606. Grand total $374,612. Noted June 4.

California — State Hy. Comn., Sacramento, bituminous surfacing 7 mi. road from point 1.5 mi. north of Yreka to Klamath River, to Heafey-Moore Co., 344 High St., Oakland, $25,702. Noted May 21.

Calif., Bell—Grading, curbing, walks, storm drain, ornamental lighting system, concrete paving 34,500 sq.ft. Baker Ave., between Maywood and Fishburn Aves., to Kovacevich & Price, 5400 Imperial Hy., Lynwood, $26,645.

Calif., Los Angeles—Bd. P. Wks., City Hall, grading, guttering, sidewalks, sewers, 6 in. warrenite bitulithic paving 554,776 sq.ft. Wilmington Blvd. and L St. Impvt. Dist., to Southern Calif. Roads Co., 2235 East 25th St., $170,215. Noted June 9 Daily.

Calif., Los Angeles—Los Angeles Co., grading, drainage structures, using 3 in. rein.-con. pipe, 10-7-10 in. concrete surfacing 236,925 sq.ft. 14 in. asphaltic surfacing 255,575 sq.yd. 3 in. oiled macadam surfacing 160,000 sq.ft. Pomona Blvd., Impvt. 976, to J. A. Thompson, Financial Center Bldg., $144,536.

Colorado—State Hy. Dpt., Denver, grading, drainage structures, gravel surfacing 9.587 mi. road in Gunnison Co., to Cole Bros., 447 Thatcher Bldg., Pueblo, $184,503; grading, drainage structures concrete surfacing 1.127 mi. Morgan Co., to E. Selander, Greeley, $24,989.

Connecticut — J. A. MacDonald, state hy. comr., Hartford, to Mariani Constr. Co., 59 Center St., New Haven, waterbound macadam paving 4.150 ft. hy. and bridge, Newington, $19,464; bituminous macadam paving 4,476 ft. New Britain, $15,133; 2 bridges, gravel surfacing 817 ft. Rubber Ave., Naugatuck, $12,474—to J. Varvello, 89 Park St., New Haven, waterbound macadam paving 6,100 ft. hy. Haddam, $16,453; 4,765 ft. Oxford, $20,108—to John De Michiel & Bro., 58 High St., Torrington, 72 in. rein.-con. pipe culvert, Route 4, Sharon, $1,830—to J. Pascone & Son, 73 Steuben St., Bridgeport, waterbound macadam paving 8,203 ft. Bridgewater, $35,367—to J. D. Anthony, 10 Bucklin St., Providence, R. I., removal and disposal section of concrete trolley bridge on Sachem's Head Rd., Guilford, $1,366—to P. Bacco, 33 Bank St., Stamford, bituminous macadam paving 1,293 ft. Greenwich and Norwalk, $12,649—to E. Balf, 14 Haynes St., Hartford, waterbound macadam paving 3,200 ft. East Hartford, $19,235—to Atlas Sand & Gravel Co., 50 State St., Hartford, bituminous macadam paving 1,000 ft. East Hartford, $8,790. Waterbound macadam paving 6,170 ft. Cromwell, to C. W. Blakeslee & Sons, Inc., 58 Waverly St., New Haven. Grand total $162,869. Noted June 11.

Idaho—State Hy. Comn., Spokane, grading, surfacing 6.323 mi. Elk River Hy., Benewah Co., to M. J. Kuney Co., Hutton Bldg., Spokane, Wash., $71,661; bridges, approaches on North South Hy., Bonner Co., to C. H. Luberg, Spokane, $22,353.

Idaho—A. Harbour, comr. P. Wks., Boise, grading, drainage structures, surfacing roadbed 5.001 mi. Camas Co., to Eckert & Stokes, Glens Ferry, $34,030 est. $37,715—7.025 mi. Jefferson and Clark Counties, to Robinson Constr. Co., Twin Falls, $43,991 est. $63,537—4.403 mi. Bonneville Co., to Idaho Contg. Co., Boise, $36,278 est. $49,776—10.517 mi. Cassia Co., to A. O. Thorn, Strong & Grant, Boise, $88,250 est. $106,749. Grand total $202,549. Noted June 11.

Illinois—Dpt. P. Wks. & Buildings, Springfield, paving roads in Knox Co., to Jansen & Schaefer, Pekin, $28,236—Bureau and LaSalle Counties, to Trompeter & Sons, Peru, $13,498—Cumberland Co., to R. McCalman, Danville, $78,974—McHenry and Lake Counties, to Darrow & Barron, Waukegon, $310,809—Moultrie Co., to F. C. Feutz, Paris, $126,064—Lake Co., to S. J. Groves & Sons, 529 South 7th St., Minneapolis, Minn., $93,949—Fulton Co., to Sutton & Moore, Canton, $8,328—St. Clair Co., to Madison Constr. Co., Edwardsville, $117,718—Madison Co., to C. N. Lund, 815a Chestnut St., St. Louis, Mo., $36,198—grading Cumberland Co., to W. J. Sheppard, Chicago, Ill., $85,159—Winnebago Co., to R. Reise, Frankfort, Ind., $59,743—Johnson Co., to Clark-Kearney & Stark, Hannibal, Mo., $61,384. Grand total $1,020,060. Noted May 7.

Ill., Belleville—St. Clair Co., to A. R. Hursey, 1716 North 25th St., East St. Louis, grading 1.188 mi. S.A.R. Sect. 62A, 1dd. $5,802; 4.59 mi. S.A.R. 28, Sect. 82A-15d, $13,384; 1.967 mi. S.A.R. 30, Sect. 85a-15d, $9,610—to Clinton Hursey, 1134 Cleveland Ave., East St. Louis, concrete paving 0.27 mi. S.A.R. 9, Sect. 76B-15d, $11,658—to Moore Bros. Constr. Co., 2000 St. Clair Ave., East St. Louis, 3.544 mi. S.A.R. 12, Sect. 83-15d, $90,804—to Granite City Paving Co., Granite City, concrete paving 0.811 mi. S.A.R. 29, Sect. 84-15d, $27,168—to Kecler Bros., 4301 State St., East St. Louis, bituminous retread paving 0.921 mi. S.A.R. 41, Sect. 88-15d, $8,679—to Louis Rich Constr. Co., 2038 St. Clair Ave., East St. Louis, 1.849 mi. S.A.R. 10, Sect. 90-15d, $10,487—to A. P. Poirot, 721 East Washington St., 1.902 mi. S.A.R. 17, Sect. 91-15d, $22,454. Grand total $200,046.

Ill., Lincoln—Logan Co., grading 6.6377 mi. Sect. 1a M.F.T., 30 ft., to Lefferdink Constr. Co., Lincoln, $15,422. Noted June 11.

Ill., Marion—Williamson Co., concrete paving 1.091 mi. State Aid Route 11A, Sect. 4 MFT, 10 and 18 ft., to Egyptian Constr. Co., Herrin, $16,247. Noted July 2.

Indiana—State Hy. Comn., Indianapolis, grading, drainage structures, concrete surfacing 45.610 sq.yd. Rd. 56, Federal Aid Project 212-A, Scott and Jefferson Counties, to Myers Bros., Campbellsburg, $75,855. Est. $108,359. Noted Feb. 12.

Indiana—State Hy. Comn., Indianapolis, grading, paving approaches to new bridge over Ohio River, Vanderburgh Co., to Scharl Constr. Co., Grand Rapids, Mich., $188,221. Est. $279,622.

Ind., Evansville—Vanderburgh Co., asphaltic concrete paving 1st Ave., to Reichert Constr. Co., Evansville, $27,258. Est. $27,487. Noted June 4.

Ind., Valparaiso—Porter Co., concrete surfacing 1.4 mi. R. S. Moore Rd., to O'Connor & Son, Culver, $27,875 est. $40,471—macadam surfacing 2.44 mi. F. W. Ludington Rd., to W. H. Clifford, Valparaiso, $18,782 est. $22,732—1.255 mi. A. G. Knoblock Rd., to A. M. Skinner, Morocco, $11,400 est. $14,043. Grand total $58,057. Noted May 28.

Iowa—State Hy. Comn., Ames, to Bryant Paving Co., Waterloo, grading, drainage structures, paving 34,795 sq.yd. roads in Bremer Co. $65,533, 2,700 sq.yd. Clinton Co. $9,981—to W. Horrabin Constr. Co., Iowa City, 16,754 sq.yd. Johnson Co. $45,304—to Bemis & Schlick, 503 Southern Surety Bldg., Des Moines, 80,222 sq.yd. Mehaska Co. $149,853—to J. Schacht, Durant, 2,843 sq.yd. P.-523-B $6,480; 3,261 sq.yd. P-365-D $14,193, both Muscatine Co.—to J. A. Abramson, 916 Hubbel Bldg., Des Moines, 21,020 sq.yd. Dallas Co. $40,382—60,400 sq.yd. Polk Co. $138,368; grading, drainage structures 71,746 sq.yd. Dallas Co., $13,403—to J. A. Carlson Constr. Co., Omaha, Neb., 11.666 mi. Adams Co. $67,674—to Mulgrew & Sons, Dubuque, 12.276 mi. Buchannan Co. $45,936; 2.048 mi. Delaware Co. $6,314, 2.7 mi. Jackson Co. $14,455—to Shirley Constr. Co., Dubuque, 8.312 mi. Dubuque Co. $88,439—to C. F. Betts, Sioux City, 0.9 mi. Jackson Co. $10,006—to T. Nickle, Newton, 10.678 mi. Keokuk Co. $73,192—to J. B. Hannahs, Keokuk, 15.455 mi. Lee Co. $85,706—to G. W. Condon Constr. Co., Grain Exch. Bldg., Omaha, Neb., 5 mi. Cass Co. $26,143; 14.6 mi. Montgomery Co. $73,611, 12.8 mi. Page and Fremont Counties $56,987—to Lyman Richie Sand & Gravel Co., 712 Bankers Reserve Life Bldg., Omaha, Neb., gravel surfacing 12.706 mi. Pottawattamie Co. $30,959—to A. Mulvanna, Brighton, 5.706 mi. P-581 $6,136; 3.695 mi. P-687 $7,236, both Jones Co.—to Langfitt & Co., Cedar Rapids, 9.15 mi. Linn and Benton Counties $5,733—to C. R. Yegge, Boone, rein.-con. paving 4 fords in Ledge State Park, Boone Co. $1,481. Grand total $1,083,295.

Iowa—State Hy. Comn., Ames, maintenance graveling Project M-316, Osceola Co. and M-314, Lyon Co., to J. A. Huff, Armstrong, $745 and $8,827 respectively—Project M-315, Sioux Co., and Project M-313, O'Brien Co., to Evans Constr. Co., Early, $17,507 and $3,885 respectively, all foregoing in Dist. 3—M-810, Calhoun Co., Dist. 8, to J. H. Hartsell, Early, $2,556. Grand total $33,520.

Ia., Burlington—See "Sewers."

Ia., Manchester — Bd. Comrs. Delaware Co., grading 12.15 mi. secondary roads to C. F. Belz, Sioux City, and W. H. McDaniel, Monticello, $6,497 and $8,843 respectively—24 x 20 ft. I-beam bridge, to E. B. Spencer, Waterloo, $5,200—17 rein.-con. box culverts, to W. A. Burton, Waterloo, $7,790. Grand total $28,330.

Kansas—State Hy. Comn., Court House, Dodge City, to Cook & Cone, Ottawa, concrete surfacing 3.409 mi. Ellsworth Co. $79,108, gravel surfacing 12.865 mi. Seward Co. $3,927, bituminous blotter surfacing 2.951 mi. Seward Co. $903, 16 mi. Hamilton Co. $13,013—to Iowa Road Building Co., 1495 Keoway, Des Moines, Ia., 54.885 mi. Seward, Meade and Ford Counties, $28,070—to D. G. Hansen, Logan, bituminous blotter treating (gravel) 16.701 mi. Meade Co. $11,419—to D. H. Hardman, Alton, motor bed surfacing 12.46 mi. Alton Co. $7,166—to C. Hilme, Great Bend, gravel surfacing 10.46 mi. Ford Co. $4,662—to George Ross Asphalt Co., Kansas City, Mo., bituminous surfacing 3.65 mi. Atchison Co. $2,402—to M. W. Watson, Topeka, light type surfacing 12 mi. Wichita Co. $2,496—to Roberts Constr. Co., Bitting Bldg., Wichita, grading, drainage structures, concrete surfacing 0.133 mi. Brown Co. $3,385. Grand total $156,551.

Kansas—State Hy. Comn., Court House, Ellsworth, to Cook & Cone, Ottawa, light type surfacing 12.3 mi. Ottawa Co. $3,028; 9.75 mi. Mitchell and Saline Counties $3,588—to Collins Constr. Co., Leavenworth, 28.5 mi. Marion and Chase Counties $9,950 — to Davidson Constr. Co., Beatrice, 21.5 mi. Washington Co. $8,463—to Reed & Wheelock, Clay, 12.5 mi. Clay Co. $1,776—to W. D. Shay, McPherson, 5.3 mi. Marion Co. $1,908—to M. W. Watson, Topeka, 12 mi. Wichita Co. $3,576—7.53 mi. Saline Co. $2,468, 7.6 mi. Marion Co. $2,531, bituminous blotter treating (gravel) 10 mi. Dickinson and Chase Counties $3,936—to B. Metzger, Ozawkie, 11.4 mi. Geary Co. $4,013—to Blue Valley Sand & Gravel Co., Fairbury, Neb., 8.7 mi. Jewell Co. $1,836—to Vance Bros., Kansas City, Mo., bituminous blotter treating (oil) 21.4 mi. Chase, Geary and Dickinson Counties $10,480—to D. G. Hansen, Logan, 8.7 mi. Jewell Co. $1,347, to D. H. Harriman, Alton, motor bed surfacing 10.27 mi. Lane Co. $5,906. Grand total $64,806.

Kansas—State Hy. Comn., Court House, Marysville, to Cook & Cone, Ottawa, bituminous blotter treating 29.324 mi. Gray, Clark and Ford Counties $18,431—to Iowa Road Building Co., 1495 Keoway, Des Moines, Ia., 18.751 mi. Geary Co. $9,486—to Thogmartin & Reis, Ft. Scott, 0.65 mi. Johnson and Douglas Counties $885—to San Ore Constr. Co., McPherson, 20.232 mi. Ford and Clark Counties $9,855—to Western Bridge & Constr. Co., 3867 Leavenworth St., Omaha, Neb., 14.951 mi. Marshall Co. $2,804—to L. W. Moody, Wellington, light surfacing 2.5 mi. Wellington Co. $2,155—to G. Ross Asphalt Co., Kansas City, Mo., bituminous drag line surfacing 4.9 mi. Johnson Co. $4,942, 0.9 mi. Douglas Co. $1,840, bituminous retread surfacing 0.3 mi. Johnson Co. $2,510—to C. A. Ring, McPherson, grading, drainage structures 0.5 mi. McPherson Co. $3,806—to J. Day, Jr., St. Joseph, Mo., widening, cleaning, painting Turner Bridge, Wyandotte Co. $1,868. Grand total $58,589.

Kansas—State Hy. Comn., Court House, St. John, to Cook & Cone, Ottawa, light type surfacing 20 mi. roads in Harper, Butler and Comanche Counties $6,693, bituminous blotter surfacing, 1.496 mi. Seward and Haskell Counties $1,496—to D. G. Hansen, Logan, bituminous blotter surfacing (oil), 22 mi. Edwards Co. $12,474; 5.606 mi. Pratt Co. $5,397—to H. J. Hall, Manhattan, 3 mi. Stafford Co. $1,350—to Imperial Trucking Co., Kansas City, Mo., 14.534 mi. Pratt Co. $7,549—to Iowa Road Building Co., 1495 Keoway, Des Moines, Ia., 5.319 mi.

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Streets and Roads (Continued)

Cowley Co. $2,620, 3 mi. Stafford Co. $1,615; 1.609 mi. Seward and Haskell Counties $2,434—to San-Ore Constr. Co., McPherson, 9.5 mi. Edwards Co. $3,847, gravel surfacing 2.5 mi. Edwards Co. $1,418, light type surfacing, 12 mi. Reno and Barton Counties $3,650—bituminous blotter treating (gravel) 10 mi. Edwards Co. $4,050—to Thogmartin & Reis, Ft. Scott, 5.928 mi. Cowley Co. $2,189; light type surfacing 25 mi. Sumner and Sedgwick Counties $10,269—to M. W. Watson, Topeka, 20.5 mi. Kiowa and Rush Counties $9,506, bituminous blotter treating 1.5 mi. Shawnee Co. $2,014 — to Western Bridge & Constr. Co., 3867 Leavenworth St., Omaha, Neb., bituminous surface mix treating 14.157 mi. Stafford Co. $54,168—to H. Wilcox Anthony, light type surfacing 6 mi. Kingman Co. $2,000—to L. W. Woody, Wellington, 4 mi. Sedgwick Co. $777—to Yant Constr. Co., 9 mi. Pawnee Co. $1,180—to E. Graff, Newton, 17.5 mi. Barton and Harvey Counties $5,740—to G. H. Shay, 17 mi. Cowley and Sedgwick Counties, $4,760—to F. G. McKinney, Great Bend, 5 mi. Barton Co., $990, to W. F. O'Brien, St. Paul, 3 mi. Harvey Co. $996—to List & Clark, Kansas City, Mo., 3 bridges Morris Co., $30,324—to E. King, Hesston, bridge, Reno Co. $1,716—to Tomlinson Bridge & Supply Co., Wichita, bridge, Sedgwick Co. $14,933. Grand total $196,254. Noted May 21.

Kan., Ft. Scott—Vertical fibre brick on concrete surfacing 4 blocks, to Thogmartin & Reis Constr. Co., Ft. Scott, $25,000.

Kan., Hutchinson — City Council, concrete paving North Plum St., to J. H. Shears & Sons, Hutchinson, $17,266—North Washington St., to Stamey Constr. Co., Hutchinson, $4,361—concrete curbing West 11th St., to C. E. Brown, Hutchinson, $1,879.

Kan., Kansas City—City Council, concrete paving double track street railway of Kansas City Pub. Serv. Co., to Wyandotte Ry. Co., 1500 Grand Ave., $138,000. Est. $152 250.

Maryland — State Roads Comn., Baltimore, G. C. Uhl, chn., grading, drainage structures 5.21 mi. Contr. A-88-64, Allegany Co., to Thomas, Bennett & Hunter, Westminster, $92,984; sheet asphalt paving 0.59 mi. Contr. BC-105-72, Baltimore City, to National Paving & Contg. Co., Menlo Dr. and Western Maryland R.R., Baltimore, $84,742. Noted June 18.

Maryland — State Roads Comn., Baltimore, sheet asphalt paving 0.58 mi. Contr. BC-106-74, Baltimore City, to Amer. Paving & Contg. Co., Montebello Ave., Baltimore, $71,949. Noted June 25.

Maryland—State Roads Comn., macadam paving 2.56 mi. Contr. G-50-64, Garratt Co., to Thomas, Bennett & Hunter, Westminster, $97,971.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, gravel surfacing 1.48 mi. Contr. Ch-104-82, Charles Co., to Dundalk Contg. Co., Dundalk, $13,976. Noted May 28.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, macadam resurfacing 2.49 mi. Contr. W-90-64, Washington Co., to H. E. Gosnell Co., Frederick, $39,085. Noted Apr. 16.

Massachusetts—Dpt. P. Wks., A. W. Dean, State House, Boston, bituminous macadam paving 9,760 ft. hy. Sharon, to Dingley & Hoy, Sherborn, $43,420—5,900 ft. Lenham, to Welch & Moynihan, 15 Front St., Salem, $29,695—gravel and bituminous macadam paving 3,300 ft. Carlisle, to A. Pallotto, Bridge St., Dracut, $4,783 — 5,295 ft. West Newbury, to J. J. Watkins, 18 Glenwood St., Amesbury, $11,708. Grand total $89,606. Noted June 11.

Massachusetts—Dpt. P. Wks., State House, Boston, bituminous macadam paving 6,950 ft. hy. Needham, to M. Pandolph Co., Inc., Sachem Rd., Needham Heights, $36,301 — 3,000 ft. Dighton, to Z. L. Candey, East Taunton, $16,682—5,945 ft. Canton, to J. F. Kennedy & Co., 197 Sidney St., Cambridge, $30,229—gravel and bituminous macadam paving 4,850 ft. Rochester, to S. W. Lawrence, Falmouth Heights, $12,412—5,400 ft. Savoy, to H. W. Flaherty, Center St., Adams, $29,861. Grand total $125,485. Noted June 18.

Massachusetts—Metropolitan Dist. Comn., 20 Somerset St., Boston, widening, surfacing portions Revere Beach Parkway, Medford and Everett, to McDonough Co., Saugus.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., sheet asphalt paving South Huntington Ave., to B. Faletra, 26 Averton St., Roslindale, $21,838. Est. $25,000.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., sheet asphalt paving Buchanan Rd., Roslindale, to M. DeMatteo, 55 Stella Rd., Roslindale. Est. $25,000. Noted June 18.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., sheet asphalt paving Hyde Park Ave., Hyde Park, to M. M. McGinnis, 65 Pershing Rd., Jamaica Plain, $94,843.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr. sheet asphalt or bitulithic paving Pembroke St., to J. J. McCarthy, 121 Dorchester St., Dorchester, $38,972. Noted June 11.

Mass., Brookline (br. Boston)—Town, Bd. Selectmen, sheet asphalt paving Churchill and Chilton Sts., to C. & R. Constr. Co., 75 Bradeen St., Roslindale. Est. $25,000.

Mass., Brookline (br. Boston)—Bd. Selectment, H. A. Varney, Town Hall, sheet asphalt paving Aspinwall Rd., to John McCourt Co., 910 Huntington Ave., Boston. Est. $25,000.

Mass., Cambridge—W. R. McMenimen, supt. streets, City Hall, sheet asphalt paving Prison Point St. A. Orlando, Inc., 25 Pope St., East Boston, at $5 per sq.yd. Est. $25,000. Noted May 7.

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Mass., Pittsfield—Rein.-con. paving Bartlett, Pomeroy, Willis, Dwight, Backman, Dawes Sts., to C. B. Lindholm, Pittsfield, $40,030.

Michigan—H. W. Hagaman, div. engr., 504 Eddy Bldg., Saginaw, grading, shaping, drainage, 20 ft. concrete paving 0.69 mi. FO56-20C-I, Midland Co. and 8.245 mi. FO37-186-I, Isabella Co., for State Hy. Dpt., Lansing, to T. McNally, Saginaw, $18,739 and $172,126 respectively. Noted June 11.

Michigan—W. J. Kingscott, div. engr., 309 McNeir Bldg., Kalamazoo, shaping, 20 ft. concrete paving 2.992 mi. FO39-13C-4, Kalamazoo Co., West Michigan Constr. Co., Holland, for State Hy. Dpt., Lansing. $65,903. Noted June 11.

Michigan—H. G. Oakes, div. engr., Plymouth, grading, shaping, drainage, 20 ft. concrete surfacing 7.277 mi. FO46-20C-1, Lenawee Co., to H. W. McKenzie, Dearborn, for State Hy. Dpt., Lansing. $169,819. Noted June 11.

Michigan—J. T. Sharpensteen, div. engr., Escanaba grading, shaping, drainage structures, concrete paving 2.389 mi. FO17-33C-2, Chippewa Co., to Thornton Bros. Co., Hancock, $78,625; grading, shaping, drainage structures, concrete surfacing 4.721 mi. FO17-35C, Chippewa Co., to Delta Contg. Co., Escanaba, $138,123, for State Hy. Comn., Lansing. Noted June 11.

Michigan—J. T. Sharpensteen, div. engr., Escanaba, grading shaping, drainage structures, concrete surfacing 2.085 mi. FO52-23C-1, Marquette Co., to C. G. Bridges, Escanaba, for State Hy. Comn., Lansing. $85,339. Noted June 11.

Mich., Bay City—Bay Co. Road Comn., shaping, grading, drainage structures, concrete paving 3 mi. Salzburg Rd., to J. W. Ederer Co., Saginaw, $27,007.

Minnesota—State Hy. Dpt., St. Paul, grading 8.6 mi. State Project 2-35, Sect. 2, to Strom Constr. Co., Gary, $81,947. Noted June 4.

Minn., Minneapolis—A. P. Erickson, aud. Hennepin Co., Court House, grading 3.3 mi. County Project 829, S.A.P. 13, Sect. 1 to J. J. and M. S. Mergens, 425 Gateway Bank Bldg., $8,624 est. $14,003; 2.3 mi. Sect. 2, to S. J. Peterson, 2942 Pleasant Ave., $6,642 est. $11,724. Noted June 11.

Miss., Holly Springs—Marshall Co., grading, graveling 8 mi. Red Banks Rd., to A. J. Brown, Jasper, Ala., $26,343.

Mo., Clayton—St. Louis Co., Court House, paving concrete paving 12,414 ft. Big Bend Blvd., 20 ft., to W. C. Meneely Co., Denny and Conway Rds., $79,228.

Mo., Kansas City—Comrs. Jackson Co., Court House, furnishing, applying 2,000,000 gal. road oil, to P. Patton, 1921 Woodland Ave., Kansas City, at $0.57 per gal. Noted June 11.

Mo., St. Louis—Bd. P. Serv., City Hall, to Asphalt Paving Co. of St. Louis, 1328 Sublette Ave., asphalt paving 2,500 sq.yd. Emma Ave. $17,503; 2,900 sq.yd. Lexington Ave. $18,110; 1,615 sq.yd. Wyoming St. $9,158; 2,295 sq.yd. Wyoming St. $8,171—to Eyermann Contg. Co., 1210 South Grand Blvd., grading, concrete paving alleys in City Block 1656, $3,820—to Kunze Constr. Co., 5926 Scanlon Ave., City Blocks 2750, 2826 and 4383SA, $4,665—to A. Lewald, Inc., 5473 Delmar Blvd. in City Block 4415WA $2,785. Grand total $64,212. Noted May 21.

Nebraska — State Hy. Comn., State House, Lincoln, paving 9.1 mi. F.A.P. 300B, Scotts Bluff Co., to A. H. Read, Omaha, $193,176—grading 5.1 mi. Valley and Garfield Counties, to E. W. Nichols, Fairmont, $29,000; graveling same road, to L. G. Crownover, Lincoln, $14,341; culverts, on same road, to Norfolk Bridge & Constr. Co., Norfolk, $8,367; road and driveway pipe, in Scotts Bluff Co., and in Valley and Garfield Counties, to A. N. Eaton Metal Products Co., 1301 Willis St., $2,252 and $2,104 respectively—bridges in Scotts Bluff and Valley and Garfield Counties; also Scotts Bluffs Co., to Diamond Eng. Co., Grand Island $16,117 and $12,919 respectively. Grand total $278,276.

New Hampshire—State Hy. Dpt., Concord, 3 in. on 12 in. gravel surfacing 12.461 cu.yd. North Littleton Rd., Littleton, to Littleton Constr. Co., Littleton, $24,615. Est. $40,000.

New Jersey — State Hy. Dept., Trenton, furnishing, erecting structural steel, ramp connections Route 25, Connecting Link, Sect. 1, and Route 25, Sect. 3, Contr. 49, Jersey City, Hudson Co., to Thompson, Leopold & Fredburn Constr. Co., 60 East 42nd St., New York, $1,287,833—rein.-con. paving 29,925 sq.yd. Route S-3, Sect. 2, Clifton, Passaic Co., to Nesto Constr. Co., 151 Verona Ave., Newark, $117,559—32,255 cu.yd. Route 42, Sect. 6-A, Atlantic Co., to Versaggo Bros. Constr. Co., Wildwood, $171,251. Grand total $1,576,643. Noted June 11.

N. J., Elizabeth—Bd. P. Wks., City Hall, recurbing, sheet asphalt on 6 in. concrete paving North Broad St., to J. R. Gilligan-Casey Co., 972 Broad St., Newark, $60,117. Noted June 12 Daily.

New York—A. W. Brandt, comr. Hys., Albany, concrete paving 8.54 mi. Livington Co. and 3.99 mi. Onondaga Co., to Warren Bros. Road Co., Cambridge, Mass., $384,235 and $244,000 respectively est. $568,906 and $314,570 respectively—1.99 mi. Erie Co. to E. E. Buck & J. Biscaro, Dunkirk, $12,465 est. $274,705—5.13 mi. Orange and Ulster Counties, and 5.7 mi. Jefferson Co., to Lane Const. Corp., 37 $209,090 respectively est. $356,089 and Colony St., Meriden, Conn., $241,525 and $298,593 respectively — 2.28 mi. Chenango Co., to J. F. Paddelford, Sherburne, $99,273 est. $125,667—3.77 mi. Genesee Co., to W. J. Gallagher, Medina, $144,853 est. $196,952—3.22 mi. Washington Co., to R. E. Weber, 246 State St., Schenectady, $115,659 est. $147,636—gravel on concrete paving 0.86 mi. St. Lawrence Co. to J. Arborio Constr. Co., Inc., West Cedar St., Poughkeepsie, $210,148 est. $314,341—viaduct in Westchester Co., to Myers Constr. Co., Inc., New York, $144,649 est. $214,168. Grand total $2,005,897. Noted June 4.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, to B. Turecamo Contg. Co., New Cropsey Lane, concrete surfacing Banner Ave. $13,731; asphalt paving East 29th St. $10,062; East 42nd St. $5,589; East 48th St. $11,226; East 49th St. $7,446; Avenue J $23,807; Lake St. $8,808; Sheffield Ave. $3,368; Avenue U $12,942; West 4th St. $7,199; 52nd St. $17,371—to Brooklyn Alcatraz Asphalt Co., 407 Hamilton Ave., asphalt block paving Brooklyn Ave. $12,043; Johnson St. $2,343; Linden Blvd. $13,308; 5th St. $8,329—to C. R. Contg. Co., 2266 Gravesend Ave., regulating Voorhies Ave. $1,403—to Castle Bros., Snyder Ave. and Johnson Pl., Nostrand Ave. $7,085—to Pomonok Asphalt Paving Co., 1245 Grand St., asphalt paving Starr St. $4,079—to J. and M. Moran Excavating Co., 413 Sterling Pl., grading 85th St. $854—to W. J. McHale Contg. Co., 1250 Jefferson Ave., regulating West 3rd St., $1,967. Grand total $172,954. Noted June 11.

N. Y., New York—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., paving Nereid Ave., to Bronx Asphalt Co., 819 Edgewater Rd., $49,205—Fowler Ave. and East 163rd St., to C. B. Beckwith, Inc., Seneca Ave. and Edgewater Rd., $9,185 and $5,687 respectively—regulating Tenbroeck and Longfellow Aves., to P. Mascali, 454 Tremont Ave., $2,494 and $3,608 respectively—Holland Ave., to Rusciano Contg. Co., 305 East Kingsbridge Rd. $3,880—232nd St., to T. DiRoma, 33 Evelyn Pl., $4,618. Grand total $78,677. Noted June 18 Daily.

Ohio—O. W. Merrell, dir. hys., Columbus, concrete and bituminous macadam widening 7.737 mi. Sect. "P" and others, Brown and Highland Counties, to S. Monroe & Sons, Portsmouth, $101,108. Noted June 18.

O., Cleveland — Bd. Comrs., Cuyahoga Co., integral curbing 14,000 lin.ft., 3 in. brick paving 4,500 sq.yd. Rockside Rd., to Highway Constr. Co., Builders Exch. Bldg., $45,923. Est. $48,577. Noted June 18.

O., Cleveland—Cuyahoga Co., grading, 3 in. vitr. brick on 8 in. concrete paving 9,600 sq.yd. St. Clair Ave., to Gould Constr. Co., 16311 Saranec Rd., $30,840. Est. $42,200.

O., Cleveland—Cuyahoga Co., grading, sandstone curbing, 4 in. drain tile, brick surfacing 3,900 sq.yd. Eddy Rd., to H. G. Herring, 1660 Wayside Rd., $17,982; grading, sandstone curbing, 4 in. drain tile, concrete surfacing 7,900 sq.yd. Warrensville-Center Rd., to Rieley Bros., The Arcade, $16,303. Noted June 11.

Okla., Oklahoma City—Oklahoma Co., graveling 16 mi. roads, 20 ft. to Western Paving Co., Petroleum Bldg., $24,786. Est. $26,000.

Oregon—State Hy. Comn., Salem, grading 34.62 mi. Lake View Hy., Lake Co., to McNutt & Pyle, Eugene, $60,465; 18.64 mi. Lake View Hy., Lane Co., to C. R. Johnson, Portland, $62 720.

Pa., New Castle—Grading, curbing, paving Blaine St. and Meyer Ave., to Victor Olson Contg. Co., Mahoning Bank Bldg., $23,700. Est. $25,000.

Pa., Phila.—Bureau Hys., Dpt. P. Wks., City Hall Annex, A. Murdock, dir., to Union Paving Co., Broad and Stiles Sts., Schedule B, asphalt paving (assessment work), Dudley St., $3,115; Schedule "D" asphalt repaving Cumberland St., $16,617; Judson St., $1,070; Schedule "E" redressed granite block paving Cumberland St., $9,381—to Marino Masse, 3936 North Reese Sts., Schedule "A" grading Homestead, Howell and Langdon Sts., $1,054—to Acchione Contg. Co., 1607 McKean St., Schedule "C" vitr. block paving (assessment work) Pechin St., $8,653; Schedule "E" redressed granite block repaving Mattis St., $1,135. Grand total $41,475. Noted June 18.

Pa., Pittsburgh—R. G. Woodside, controller Allegheny Co., grading, constructing hy bridge, paving 3,945 ft. Saw Mill Run Blvd. Extension, Contr. 2, 40 ft., to M. O'Herron Co., South 1st and McKean Sts., $152,721. Est. $181,000. Noted June 19.

Texas—G. Gilchrist, state hy. engr., Austin, to L. E. Whitham & Co., Wichita Falls, grading, drainage structures, concrete paving 118,909 sq.yd. Lipscomb Co., $215,213, est. $280,000; 146,187 sq.yd. Hemphill Co., $303,130, est. $380,000; rein.-con. paving 177,712 sq.yd. Wheeler Co., $307,911, est. $240,000; 87,498 sq.yd. Cottle Co., $127,583, est. $160,000—to Brown & Root, Inc., Colorado St., Austin, grading, drainage structures, concrete paving 23,350 sq.yd. Fort Bend Co., $50,638 est. $60,000; grading, drainage structures 14.881 mi. San Jacinto Co., $47,272, est. $60,000—to J. W. Zempter Constr. Co., 717 Fish Bldg., Amarillo, grading, drainage structures, concrete paving, 45,511 sq.yd., Lubbock Co., $89,038, est. $96,000—to H. B. Zachary Constr. Co., Laredo, concrete base course paving 56,945 sq.yd., Gonzales Co., $86,328 est. $100,000—to Jagoe Constr. Co., Denton, special double bitulithic surface treating 16.82 mi. Callahan and Eastland Counties, $21,714 est. $32,000—to Nueces Constr. Co., Corpus Christi, limestone rock asphalt surfacing 6.618 mi. DeWitt Co., $22,432 est. $32,000—to Dozier Constr. Co., Littlefield

Streets and Roads (Continued)

Bldg., Austin, double bituminous on caliche base surface treating 9.312 mi. Scurry and Mitchell Counties, $64,668 est. $90,000—to Harrison Engr. & Constr. Corp., 506 Mutual Bldg., Kansas City, Mo., concrete paving 200,851 sq.yd. Galveston Co., $321,233 est. $400,000—to J. P. Foty, 411 Burt Bldg., Dallas, 137,628 sq.yd. Hardeman Co., $207,818 est. $260,000—to West Texas Constr. Co., 501 East Rosedale St., Fort Worth, 117,704 sq.yd. Tarrant Co., $168,543 est. $200,000—to F. P. McElwrath Constr. Co., Box 727, Corsicana, 88,314 sq.yd. Ellis Co., $128,896 est. $180,000; 100,425 sq.yd. Navarro Co., $155,163 est. $200,000; 111,079 sq.yd. Navarro Co., $170,235 est. $230,000—to L. J. Miles, 1809 Clover Lane, Fort Worth, grading, drainage structures 15.089 mi. Crockett Co., $84,799 est. $112,000—to Cage Bros., Bishop, 13.2 mi. Kerr Co., $39,421 est. $56,000—to R. B. Sparks, 225 North Brighton St., Dallas, 7.071 mi. Wharton Co., $23,787 est. $42,000—to E. F. Bucy & Son and C. T. Childs, Rising Star, 3.92 mi. Erath Co., $24,031 est. $40,000—to Geo. W. Condon Co., Dallas, 7.781 mi. Henderson Co., $78,593 est. $100,000—to J. E. Smith & Son, Noble, Okla., 7.589 mi. Hemphill Co., $48,219 est. $60,000—to Huddleston Constr. Co., Crosbyton, 21.641 mi. Motley Co., $62,582 est. $90,000—to Huddleston & Work (C. M. Huddleston) Crosbyton, 5.287 mi. Fisher Co., $30,894 est. $46,000—to Trinity Farm Gravel Co., Box 1428, Dallas, 15.029 mi. Presidio Co., $77,202 est. $50,000—to J. S. Moore & Sons, Lufkin, 11.983 mi. Van Zandt Co., $34,616 est. $60,000; 5.587 mi. Tyler Co., $31,585 est. $40,000—to Hannah Constr. Co. and F. and D. Hall, Box 994, Waco, 13.067 mi. Culberson Co., $45,492 est. $66,000; 22.537 mi. Pecos Co., $58,297 est. $68,000—to J. C. Kelley Co., Inc., Trinity, 8.075 mi. Houston Co., $27,683 est. $42,000. Grand total, **$3,184,016.** Noted June 18.

Utah—State Rd. Comn., Salt Lake City, grading, graveling 13.47 mi. hy. in Box Elder Co., to T. O. Harris, Tremonton, $11,303 est. $12,788; surfacing 12.7 mi. hy., Beaver Co., to J. M. Sumsion, Springville, $12,474 est. $15,200.

Washington—S. J. Humes, dir. Hys., Olympia, bituminous surface treating 217.8 mj. road in Spokane, Lincoln, Adams, Stevens and Ferry Counties, to Standard Asphalt Paving Co., 603 Chronicle Bldg., Spokane, $148,623—constructing Blanchard Bridges Approaches, Skagit Co., to East Side Contg. Co., 1612 Northern Life Tower, Seattle, $22,753—oiling 34.8 mi. Methow Valley Hy. Okanogan Co., to J. F. Forbes, Olympia, $20,800—grading concrete paving 90,673 sq.yd. Benton and Kakima Counties, to Albertson & Cornell Bros., Inc., 11134 A St., Tacoma, $187,409. Grand total $379,585. Noted June 11.

Wash., Port Townsend—Jefferson Co., constructing Upper Hoh Road, to Strong & McDonald, Puget Sound Bank Bldg., Tacoma, $35,775. Noted June 4.

Wash., Seattle—King Co., Court House, regrading, paving 17,500 sq.yd. Issaquah-Newport Rd., to Fiorito Bros., 3950 6th St. N. W., $58,743. Est. $52,000. Noted May 28.

Wisconsin—State Hy. Comn. and Hy. Coms. Monroe and Juneau Counties, Madison, grading 10.96 mi. Option A, F. A. P. 325 F and D, to Nelson, Mullen & Nelson, 355 Gateway Bldg., Minneapolis, Minn., $203,328—8.203 mi. Option B, F. A. P. 325-C, to Burch Constr. Co., Madison, $80,137—constructing James Bridge, to Metzer & Son, Blair, $4,049—Franz Bridge, to W. Blake & Sons Constr. Co., Appleton, $7,297. Grand total $295,441. Noted June 11.

Wisconsin—State Hy. Comn., Madison, furnishing, applying 190,000 gal. Type C asphalt, to Shell Petroleum Corp., Shell Bldg., St. Louis, Mo., $13,352—10,000 gal. Type F asphalt, to Standard Oil Co. of Indiana, 414 Michigan Ave., Milwaukee, $14,884—300 tons calcium chloride, to Cunningham-Ortmayer Co., 15 Michigan Ave., Milwaukee, $8,775—applying 190,000 gal. Type C asphalt, to Sarrington Milling Co., Delton, $1,995 — 334,000 gal. in Forest and Vilas Counties, to J. W. Craig Co., 410 New York Life Bldg., Minneapolis, Minn., $3,975. Grand total $42,981.

Wisconsin—State Hy. Comn. and Hy. Comrs. Grand and Crawford Counties, Lancaster, **(a)** furnishing **(b)** applying asphalt on (1) Rockville-Dickeyville Rd. (2) Prairie du Chien-Eastman Rd. (3) Potosie Streets (4) Bridgeport Bridge Approaches (5) Bridgeport Prarie du Chien Rd., to American-Mexican Refining Co., 11 South LaSalle St., Chicago, Ill. **(a1)** $1,066 **(a2)** $609 **(a3)** $2,253—to Seneca Petroleum Co., 439 West 33rd St., Chicago, Ill., **(b1)** $245 **(b2)** $140 **(b3)** $518 **(b4)** $140 **(b5)** $390—to Standard Oil Co. of Indiana, 910 South Michigan Ave., Chicago, Ill., **(a4)** $384 **(a5)** $1,137. Grand total $6,882. Noted June 18.

Wisconsin—State Hy. Comn. and Hy. Coms. Barron and Washburn Counties, Superior, grading, draining 1.341 mi., Dodge Co., to Goodearle & Baemisch, Dane, $10,969—approaches to Hammer Overhead, Dodge Co., to Burch Constr. Co., Madison, $27,904—24.026 mi. Barron and Washburn Counties, to Colburn-Thurston Co., Merrill, $177,172. Grand total $216,045. Noted June 18.

Wis, Black River Falls—Jackson Co., grading 2.13 mi. Melrose-Taylor Rd., to G. B. Calkins, Melrose, $5,686; 1.9 mi. Franklin-Disco Rd., to Kelly Constr. Co. Taylor $4,657.

Ont., Toronto—W. J. Stewart, mayor, City Hall, concrete paving 2 lanes, to Kilmer & Barber, Harbor Bld., $3,347—asphalt paving Sect. A, Queen's Quay to Warren Bituminous Paving Co., Ltd., 84 University Ave., $36,787—asphalt paving Sect. B, Queen's Quay, to Law Constr. Co. Ltd., 225 Sterling Rd., $34,328. Grand total $74,462.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

N. J., Asbury Park—Bd. City Comrs., City Hall, timber bulkheads along ocean front, $25,000. M. Rogers, 418 Monmouth Bldg., Bradley Beach, boro engr.

N. J., Jersey City—Morris Basin Dry Dock Co., foot Henderson St., additional drydocks, timber bulkhead and piling in certain portions land leased from city on Little Basin. **Maturity about September.** Noted May 21.

Okla., Oklahoma City — Oklahoma County Comrs., channel change North Canadian River at Ash St., incl. 300,000 cu.yd. excav. $30,000. L. M. Bush, City Hall, engr.

Okla., Purcell—Bd. Comrs. McClain Co. preliminary plans draining, dredging 400,000 cu.yd. South Walnut Creek, near here. $36,000. Milliken & Whiteneck, Majestic Bldg., Oklahoma City, engrs.

Pa., Kittanning—City Council, 2,500 ft. sand, gravel dyke, 4 to 12 ft. high, 11 ft. wide at bottom, sloped at top, from Dam 7 to Ewing St. **Maturity soon.**

Tex., Harlingen—Cameron Co. Water Impvt. Dist. 19, c/o W. A. Trimps, pres., Harlingen, irrigation system for 10,000 acre tract. $750,000 bond election soon for same. A. Tamm, 209½ West Jackson St., engr. Boundary election for District carried. Noted June 4.

Ont., Oshawa — Dpt. P. Wks., Parliament Bldg., Ottawa, soon takes bids dredging in harbor, $13,000; new timber, concrete docks, $57,000; freight shed, $5,000. K. M. Cameron Parliament Bldgs., Ottawa, engr.

BIDS ASKED

Calif., Vista—July 14, by W. C. Witman, secy. Vista Irrigation Dist., furnishing 46,000 ft. 3- to 8-in steel pipe.

Ia., Sioux City—July 17, by E. V. Moone, city clk., straightening Perry Creek, incl. 42,000 cu.yd. excav., also extending several storm and sanitary sewers. $15,000. L. Hintgen, City Hall, engr.

La., New Orleans—July 21, by Bd. Levee Comrs. of Orleans Levee Dist., 606 Common St., 7,102 ft. new levee on west bank Mississippi River, Delacroix and Beka Plantations, 10 mi. below Morgan Street Ferry Landing, Algiers incl. 190,000 cu.yd. earthwork. J. Klorer, c/o owner, ch. engr.

N. J., Cape May — July 12, by Bd. Boro Comrs., H. Markley, clk., Fire House, system steel jetties on shores of Atlantic Ocean and Delaware Bay. H. S. Hoffman, boro engr.; adv. E. N.-R. July 9.

O., Cleveland—July 10, by Bd. Comrs. Cuyahoga Co., retaining wall Fairmount Blvd., 1,374 cu.yd. concrete, 101,000 lb. reinforcing steel, 1,815 cu.yd. excav. $27,627; July 14, retaining wall on Main St. Bridge in Chagrin Falls, 715 cu.yd. concrete, 870 cu.yd. excav., 75,000 lb. reinforcing steel, 740 sq.yd. waterproofing, $12,857. F. Williams, Court House, engr.

Okla., Oklahoma City—July 13, by M. Peskek, city clk., channel changes near Ash St. $30,000. L. M. Bush, city engr.

CONTRACTS AWARDED

Ind., Fowler—Benton Co., constructing 8 mi. Harrison Ditch, incl. 40,180 ft. open ditch, 1,550 ft. 12- to 20-in. tile, to N. J. Cole, Ligionier, est. $25,600; 5 mi. Brumm Ditch, incl. 16,616 ft. open ditch, 18,605 ft. 6 and 30-in. tile, to W. F. Sternberg, Piper City, est. $27,710. Noted June 11.

Ind., Monticello—Bd. Comrs. White Co., dredging Swygman Ditch, in White, Jasper and Benton Counties, to Sell Bros. & Spencer, Wolcott, $95,000.

La., Lake Charles—Lake Charles Dock Bd., dredging 125,000 cu.yd. preparatory to building new docks, to Lake Arthur Dredging Co., Beaumont, Tex.

Mass., Beverly—City, P. Serv. Dpt., concrete sea-wall at Independence Park, to McCarthy Bros., 52 Driscol St., Peabody, at $23.30 per lin.ft.

Mass., Boston—City, Dpt. P. Wks., J. A. Rourke, comr., dredging 4,300 cu.yd. docks at Albany St. and Victory Rd. Garbage Station, to Bay State Dredging & Contg. Co., 62 Condor St., East Boston, $10,440.

Mass., Boston—Park Dpt., 33 Beacon St., drainage and filling at Smith's Pond Playground, Hyde Park, to A. G. Tomasello & Son, Inc., 250 Stuart St., $24,950. Noted June 4.

New Jersey—Bd. Commerce & Navigation, State House, Trenton, dredging in Peck's Bay, to Hill Dredging Co., Ventnor, at $0.1374 per cu.yd. Noted May 28.

N. J., South River—Port Raritan Dist Comn., dredging 70,000 cu.yd. South River, to Trimount Dredging Co., Boston, Mass., at $0.1286 per cu.yd.

New York—Bd. Health, S. W. Wynne, pres., 5050 Pearl St., New York, cleaning, maintaining ditches already installed or otherwise improve certain areas in Salt Marshlands and meadows in Brooklyn, Queens, Richmond and Bronx Boros, to Lamb & Jensen Dredging Co., Freeport, at $0.01333. Noted June 18.

Tex., Edinburg—Hidalgo Co. Irrigation Dist. 1, c/o W. H. Cockcroft, pres., Edinburg, completing irrigation project, constructing 8½ mi. concrete lined canals, 100 mi. concrete lined branch canals, to Western Gunite Corp., Pasadena, Calif., $300,000.

Ont., Cobourg—N. Desjardins, secy. Dpt. P. Wks., Ottawa, dredging, to Canada Dredging Co. Ltd., Midland, $23,500. Est. $30,000.

Quebec—Dpt. P. Wks., Ottawa, Ont., dredging in Nicolet, to Cummings & Robinson, 64 Chesterhill Rd., Toronto, Ont., $11,068; dredging in Batiscan River, to St. Francis River Dredging Co., St. Francis, $11,000.

Bond Elections

Coming Bond Elections

Waterworks—Elma, Wash., July 30, $30,000.

High School—Pocatello, Idaho, Bd. Educ., July 9, $350,000.

Stadium—Washington, Pa., Bd. Educ., July 22 or 23, $125,000.

Bonds Voted

Sewerage System—Paxtang, Pa., $90,000.

Bonds Defeated

Water Distribution System — Shawnee, Kan., $27,500. E. T. Archer & Co., Kansas City, Mo., engrs.

Court House — Faribault, Rice Co., Minn., $129,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Calif., Alameda—SEWERS, etc—U. S. Eng., for Dennison St., Oakland, 5,500 lin.ft. 10-to 33-in. sewer pipe, 1,200 ft. power duct line, 3,496 lin.ft. rail, spur track, 1.5 mi. 6 in. c.i. pipe, valves, hydrants, in connection with fresh and salt water lines for Government Island Project.

Ind., Connersville—POST OFFICE — Treas. Dpt. at office Sup. Archt., rein.-con., brick post office.

Ia., Cedar Rapids—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by Cannen & Tetzer, Templeton Bldg., Salt Lake City, Utah, concrete, brick, stone. $750,000. Noted Jan. 15.

Mass., Lynn—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, Willow, Osford and Buffam Sts. $700,000.

Minnesota—DREDGING—U. S. Eng., 615 Commerce Bldg., St. Paul, bids probably in August, 110,000 cu.yd. dipper dredge work in Mississippi River, between Government dam and mouth of Minnesota River.

O., Cleveland—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by Walker & Weeks, 2341 Carnegie Ave., 6 story, basement, stone, steel, concrete, West 3rd and Prospect Sts. $5,250,000. P. L. Small, Inc., Terminal Tower, assoc. archts. Noted Apr. 10.

Tenn., Knoxville — POST OFFICE — Treas. Dpt. at office Sup. Archt., retained Baumann & Baumann, archts., 815 Market St., to design and supervise construction U. S. Post Office, Walnut, Cumberland, Locust and Main Sts. $1,575,000.

Va., Norfolk—DREDGING—U. S. Eng. 886,940 cu.yd. at Army Base Piers, Norfolk Harbor.

Wash., Seattle—BREAKWATER—U. S. Eng. preliminary surveys Shilshole Bay Breakwater at entrance to Lake Washington Ship Canal. $1,500,000.

BIDS ASKED

Ark., North Little Rock—POST OFFICE—July 15, by Treas. Dpt. at office Sup. Archt., 2 story, basement, brick, steel, 5th and Main Sts. $110,000. Noted June 4.

California—ROAD—July 16, by C. H. Sweetser, dist. eng. Pub. Rds., 461 Market St., San Francisco, grading 6.139 mi. Sect. C, Route 47, Oakhurst Natl. Forest Hy., Madera Co.

Connecticut—DREDGING—July 24, by U. S. Eng., Providence, R. I., 53,400 cu.yd. in Stamford Harbor and 42,700 cu.yd. in Greenwich Harbor; adv. E. N.-R July 9. Noted Apr. 30 and May 7.

Conn., New Britain—POST OFFICE—July 23, by Treas. Dpt. at office Sup. Archt., U. S. Post Office. Noted Nov. 6.

Illinois and Missouri—PILING DIKES—July 21, by U. S. Eng., St. Louis, Mo., 600 lin.ft. piling dikes at Eliza Towhead, Ill., and Commerce and Harlow Island, Mo.

Ill., Chicago—POST OFFICE—Aug. 10, by Treas. Dpt. at office Sup. Archt., constructing (except elevators, lighting fixtures, mail handling equipment) U. S. Post Office; adv. E. N.-R. July 9. Noted Apr. 9.

Louisiana—EARTHWORK—July 31, by U. S. Eng., foot Prytania St., New Orleans, 650,000 cu.yd. earthwork in South Bank Red River Levees, 2nd New Orleans Dist.

Mass., Camp Devens—ELECTRIC DISTRIBUTION SYSTEM—July 29, by Con. Q. M., constructing, connecting and completing electrical distribution system; adv. E. N.-R. July 9.

Mass., Palmer—POST OFFICE—July 24, by Treas. Dpt. at office Sup. Archt., demolishing, removing present structures and constructing U. S. Post Office; adv. E.N.-R. July 9. Noted May 7.

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Federal Government (Continued)

Mississippi — EARTHWORK — July 16, by U. S. Eng., P. O. Box 667, Vicksburg, 32,000 cu.yd. earthwork on east bank Mississippi River.

Missouri — REVETMENT WORK — July 21, by U. S. Eng., Memphis, Tenn., 5,000 lin.ft. revetment work in Mississippi River, vicinity of Island 18.

Mo., Farmington—POST OFFICE—July 17, by Treas. Dpt. at office Sup. Archt., concrete, brick, steel. $90,000. Noted May 7.

Mo., St. Louis—REVETMENT—July 16, by U. S. Eng., 1,500 to 3,500 ft. revetment in Mississippi River at Burnham Island; 1,500 to 3,500 ft. at Osborne Field. Noted July 2.

Mont., Helena—POST OFFICE—July 27, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Nev., Boulder City — EMPLOYEES BUILDINGS — July 15, Bureau Reclamation, six 4 room and six 3 room residences, hollow brick walls, concrete founds. R. F. Walter, Denver, Colo., ch. engr.

Oregon and Washington—PILING, etc.—U. S. Eng., Portland, Ore., bids about Aug. 1, trestling piling and jetty reconstruction at mouth Columbia River.

Ore., Baker—DAM—Spec. 523—July 27, by Dpt. Interior, Nyssa, constructing Thief Valley Dam, Baker Project. E. Mead, comr.

Pa., Wellsboro—POST OFFICE—July 22, by Treas. Dpt. at office Sup. Archt., constructing U. S. Post Office. Former bids rejected; adv. E. N.-R. July 9. Noted June 4.

Tex., Galveston—DREDGING—July 21, by U. S. Eng., 377,000 cu.yd. Savine Neches Waterway, Texas at inner end Sabine Pass Jetty Channel and Sabine Pass and Port Arthur Canal.

Tex., Randolph Field—LIGHTING SYSTEM—July 25, by Con. Q.M. night lighting system for Randolph Field.

Tex., Randolph Field—PUMPS—July 15, by Con. Q.M., installing, furnishing horizontal and vertical pumps, equipment for several reservoirs, swimming pools.

Va., Langley Field—RADIO BUILDING—July 28, by Treas. Dpt. at office Sup. Archt., constructing radio building at Langley Field; adv. E.N.-R. July 9.

Wyoming—ROAD—July 14, by Pub. Rds., Denver, Colo., grading, draining 13.597 mi. Tower Falls Frog of Grand Loop Natl. Park Hy., Yellowstone Natl. Park. A. E. Palen, Custom House Bldg., Denver, Colo., dist. engr.

CONTRACTS AWARDED

Colorado—ROAD—Pub. Rds., Denver, grading 2.063 mi. Six Mile Creek, Sect. C, Jefferson Co., to Hamilton & Gleason Co., Tramway Bldg., Denver, $55,674; 2.972 mi. Loveland-Freemont Pass Natl. Forest Project, Lake Co., to Cole Bros., 447 Thatcher Bldg., Denver, $47,553.

Colorado—ROADS—Pub. Rds., Denver, grading 10.606 mi. Rabbit Ear Pass Natl. Forest Rd., Grand and Routt Counties, to Cook & Ransome, Ottawa, Kan., $149,055. Noted June 11.

Illinois—LOCK GATE—U. S. Eng., 1st Chicago Dist., 333 North Michigan Ave., Chicago, miter gate and lock valve operating machinery for Dresden Island and Brandon Road Locks, to Independent Bridge Co., Neville Island, Pittsburgh, Pa., $64,700. Noted May 28.

Ill., Freeport—POST OFFICE—Treas. Dpt., at office Sup. Archt., post office, to Sjorstrom & Son, Rockford, $144,395. Noted June 4.

Ind., Greenfield—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to J. I. Barnes, Logansport, $50,500. Noted May 21.

Kan., Wolcott—DIKES—U. S. Eng., 707 Postal Telegraph Bldg., Kansas City, 14,800 lin.ft. standard clump dikes and 6,000 ft. standard revetment in Missouri River at Weavers and Pomeroy Bends, 2 mi. from here, to W. P. McGeorge, Pine Bluff, $330,690. Noted June 25.

La., Opelousas—POST OFFICE—Treas. Dpt. at office Sup. Archt., 3 story, rein.-con., brick post office, and altering existing buildings, to O. M. Gwin Constr. Co., 3503 Fern St., New Orleans, $73,850. Noted June 18.

La., Shreveport—INCINERATOR—Con. Q.M., 5-ton natural draft incinerator at Barksdale Field, to Ashton Glassell Co., P. O. Box 1393, $4,190. Noted May 15.

La., Shreveport—POST OFFICE, etc.—Treas. Dpt. at office Sup. Archt., extending, remodeling U. S. Post Office and Court House, to A. Blair, 1st Natl. Bank Bldg., Montgomery, Ala., $303,848. Noted June 4.

Mass., Squantum—HANGAR—Spec. 6516—Yards & Docks, Navy Dpt., hangar extensions to aircraft shop, Naval Reserve Aviation Base, to Hartenstine-Zane Co., 225 Bway., New York, $54,065.

Michigan—DREDGING—U. S. Eng., Detroit, 5 and 6 and 6 and 7 angles, West Neebish Channel, St. Mary's River, to Dunbar & Sullivan Dredging Co., 2312 Buhl Bldg., Detroit, $324,284. Noted May 21.

Missouri—PILING DIKES—U. S. Eng., 428 Custom House, St. Louis, 1,000 to 2,200 ft. piling dikes in Missouri River, Bonhomme Bend, Mile 38-40 left bank, to C. W. Hunter Co., 177 South Front St., Memphis, Tenn., $28,700; 4,000-7,000 ft. piling dikes in Missouri River, Mile 39-42, right bank, to Woods Bros. Constr. Co., 132 South 13th St., Lincoln, Neb., $66,100.

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Mo., Bonnet's Mills—DIKES—U. S. Eng., 707 Postal Telegraph Bldg., Kansas City, 5,180 ft. standard pile clump dikes in Missouri River at Isbell Reach, near here, to Bilhorn, Bower & Peters, Inc., 1811 Railway Exch. Bldg., St. Louis, $101,580. Noted June 25.

Mo., Lupus—DIKES—U. S. Eng., 707 Postal Telegraph Bldg., Kansas City, 4,440 lin.ft. standard pile clump dikes in Missouri River, at Plow Boy Bend, near here, to Kansas City Bridge Co., 215 Pershing Rd., Kansas City, $90,774. Noted June 18.

Mo., Marion—DIKES—U. S. Eng., 707 Postal Telegraph Bldg., Kansas City, 2,770 ft. standard pile clump dikes and 200 ft. standard crib dikes in Missouri River at Marion Bend, to Woods Bros. Constr. Co., 132 South 13th St., Lincoln, Neb., $76,455. Noted June 12.

Montana—ROAD—Pub. Rds., Portland, Ore., 400 ft. tunnel grading 5.72 mi. Transmountain Hy., Glacier Park, Glacier Co., to Colonial Building Co., Hutton Bldg., Spokane, Wash., $385,365.

New Mexico—ROAD—Pub. Rds., Custom House, Denver, Colo., grading 3.365 mi. Cedro Canyon Forest Hy. Project, Bernalillo Co. to Skousen Bros., Socorro, $48,239.

N. Y., West Point—ROADS—Con. Q. M., repairing roads in West Point Reservation, to Lane Constr. Co., 37 Colony St., Meriden, Conn.

Oregon—ROAD—Pub. Rds., Post Office Bldg., Portland, grading, surfacing 7.555 mi. Roosevelt Hy., Lincoln Co., to Knute & Lien, Portland, $56,990; grading 7.133 mi. Wapineta Cutoff, Clakamas and Wasco Counties to A. C. Greenwood, Portland, $94,820—grading 1.5 mi. United States Forresby Rd., Douglas Co., to McNutt & Pyle, Eugene, $52,604. Grand total $204,414.

Oregon—ROADS—Pub. Rds., Portland, grading 5.378 mi. Santiam Hy., Jefferson Co., and resurfacing 13.9 mi. Santiam Hy., Deschutes and Jefferson Counties, to S. H. Newell, Portland, $112,435 and $54,333 respectively; surfacing 19.64 mi. Roosevelt Hy., Lane and Douglas Counties, to Meyers Contg. Co., 309 North 14th St., Portland, $167,878. Grand total, $334,646.

Ore., Astoria—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office to Halbaur-LaBahn, 844 Rush St., Chicago, Ill., $211,000. Noted May 7.

Pa., Shreveport — CULVERT — Con. Q. M., constructing culverts, filling Black Bayou entrance to Barksdale Field, to R. B. Skannal, Shreveport, $11,183.

South Dakota—ROAD—Pub. Rds., Denver, Colo., grading 0.864 mi. Deadwood Custer-Hot Springs Forest Project, Custer Co., to Western Bridge & Constr. Co., 3867 Leavenworth Bldg., Omaha, Neb., $24,063. Noted June 4.

Tenn., Memphis—CEMENT, etc.—U. S. Eng., McCall Bldg., 240,000 bbl. portland cement, f.o.b. cars Cape Girardeau, Mo. and f.o.b. U. S. Govt. Barges at Cape Girardeau, Mo., to Marquette Cement Mfg. Co., Cape Girardeau, Mo., and 140 South Dearborn St., Chicago, Ill., base bid $312,000, est. total cost $385,000; 750,000 ft. mattress lumber, f.o.b. barges at Stoffles Landing, Deans Island, to R. E. Lee Wilson, Wilson, Ark., $12,375.

Tenn., Memphis—PILE DIKES—U. S. Eng., 37,700 lin.ft. permeable pile dikes at various locations, to Woods Bros. Constr. Co., 132 South 13th St., Lincoln, Neb., $1,000,000. Noted June 11.

Tex., Randolph Field—TANKS—Con. Q.M. gas and oil storage tanks, to Southwest Constr. Co., Del Rio, $7,350.

Utah, Salt Lake City—HOSPITAL—Vet. Bu., Arlington Bldg., general contract U. S. Hospital, to Orndorff Constr. Co., 437 South Hill St., Los Angeles, Calif., $405,600. Noted Apr. 2.

Vt., Rutland—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to Brooklyn & Queens Screens Mfg. Co., Hempstead, N. Y., $292,600. Noted June 4.

Va., Fort Myer—QUARTERS—U. S. Eng., brick steel building, to Taylor Mfg. Co., Fredericksburg. Est. $100,000. Noted June 4.

Alaska, Chilkoot Barracks—DIESEL ENGINES—Con. Q.M., three 75 hp. Diesel engines, to Worthington Co., 543 Howard St., San Francisco, Calif., $42,228.

RAILWAYS

PROPOSED WORK

Ontario—Canadian Pacific Rd., J. M. R. Fairbrain, ch. engr., Windsor St. Sta., Montreal, Que., rock ballasting between Toronto and Windsor on London Div. $500,000. Work will probably be done by day labor.

BIDS ASKED

New Jersey—See "Contracts Awarded."

CONTRACTS AWARDED

New Jersey—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., track work and rail replacement with 152 lb. rail on eastbound track, Deans to Adams; then Plainsboro to Monmouth Junction, then to Deans; day labor.

SUBWAYS AND TUNNELS

PROPOSED WORK

Ia., Sioux City—City, E. V. Moone, clk., preliminary plans rein.-con. subway, Pierce St. between 3rd St. and Missouri River Rd. $200,000. L. Hintgen, city engr. A. J. Hammond, 120 South LaSalle Ct., Chicago, Ill., consult. engrs.

Pa., Phila—Baltimore & Ohio R.R. H. C. Lane, ch. engr. system, Baltimore, Md., tunnel from Baltimore & Ohio R.R. station at 24th and Chestnut Sts. under Parkway connecting Reading R.R. tracks on Callowhill St. to 12th St. $1,000,000.

GRADE CROSSINGS

PROPOSED WORK

Calif., Riverside—City, steel girder type underpass to carry Southern Pacific Company's Pacific Electric Line over Main St. north of 1st St. $25,000. R. E. Brown, Riverside, city engr.

Missouri—State Hy. Comn., Jefferson City, eliminating grade crossing in St. Louis Co. at point where State Hy. 77 intersects the tracks of St. Louis Pub. Serv. Co. $25,985.

N. J., Ridgewood—Bd. Village Comrs., 29 Hudson St., concrete underpass under Erie R.R. at LeRoy Pl. $25,000 or more. **Maturity indefinite.** Engineer not appointed. Noted Apr. 16.

Pa., Erie—City and New York Central R.R. Co., 466 Lexington Ave., New York, F. B. Freeman, ch. engr., viaduct on East Ave., 6 city blocks long. **Maturity in late fall.**

Pa., Glenshaw — Allegheny Co., Pittsburgh, R. G. Woodside, controller, State Hy. Dpt., Harrisburg, S. S. Lewis, ch. engr., and Baltimore & Ohio R.R. Co., Baltimore, Md., H. A. Lane, ch. engr., grade crossing elimination, incl. 300,000 cu.yd. rock excav. hauled 15 mi. by railroad, relocating tracks, relocating 1.5 mi. Butler Plant Rd., Witmer Station, near here. $900,000. A. Clark, Boulevard of Allies, Pittsburgh, engr.

Tex., Dallas—Missouri-Kansas-Texas R.R. Co., F. Ringer, ch. engr., St. Louis, Mo., and Cotton Belt Ry. Co., subsidiary St. Louis Southwestern R.R., W. S. Hanley, ch. engr., Tyler, Tex., underpass, approach, Lamar St. $325,000.

BIDS ASKED

N. J., Elizabeth—See "Contracts Awarded."

N. Y., Avon—Erie R.R. Co., G. F. Fanning, ch. engr., 50 Church St., New York, bids about July 15, general contract eliminating Millers Crossing, Livingston Co. $77,300.

CONTRACTS AWARDED

N. J., Elizabeth—Central R.R. of New Jersey, A. E. Own, ch. engr., Terminal Bldg., Jersey City, eliminating 22 grade crossings, own forces. $14,000,000. Noted May 14.

O., Toronto—O. W. Merrell, dir. Hys., Columbus, seven 45-ft. and one 60-ft. span, steel grade separation over Pennsylvania R.R., to Middle States Constr. Co., 1183 Essex Ave., Columbus, $88,487. Noted June 4, under "Bridges, Ohio."

DAMS

BIDS ASKED

Pa., Canonsburg—See "Waterworks."

PIERS AND WHARVES

PROPOSED WORK

N. J., Spring Lake—PIER—Spring Lake Rod & Gun Club, C. Heilner, pres., will not build pier extension, south end boardwalk. $25,000. Project abandoned. Noted July 3, 1930.

AIRPORTS

PROPOSED WORK

Conn., Hartford—Chamber of Commerce, 100 x 120 ft. hangar. $35,000. Project postponed. Financial backing slow. I. A. Allen & Son, Inc., 100 Farmington Ave., engr. Noted Apr. 16.

Ill., Chicago—American Airways, Inc., Universal Div., Lambert St., and St. Louis Flying Field, Bridgeton, Mo., preliminary plans 160 x 200 ft. concrete, brick, steel hangar. $100,000.

BIDS ASKED

Tex., Laredo—H. A. McFarland, et al., Laredo, taking bids municipal airport on 364 acre tract near here, incl. grandstand, 5,000 seating capacity, 2¼ mi. semi-oval macadamized speedway, 6 permanent runways, necessary equipment, for complete speedway and airport. $205,000. J. W. Berretta, Inc., National Bank Commerce Bldg., San Antonio, engrs.

CONTRACTS AWARDED

Ill., Chicago—Century Air Lines, 105 West Adams St., masonry and carpentry work for 1 story, 160 x 220 ft. steel, concrete, pressed brick, airplane hangar, 4850-4904 63rd St., to G. D. Barrett, 7031 Merrill Ave. Est. $150,000.

Pa., Pittsburgh—R. G. Woodside, controller Allegheny Co., County Bldg., pump house, oil house and comfort stations at airport field, near here, Mifflin Twp., to Williamson Constr. Co., 223 Monroeville Ave., East Pittsburgh, for Allegheny Co. $18,760. Noted June 18.

GRAIN ELEVATORS

PROPOSED WORK

Idaho, Soda Springs—GRAIN ELEVATOR—Farmers Natl. Grain Corp., c/o M. G. Pence, mgr., Ogden, Utah, preliminary plans 100,000 bu. grain elevator, concrete. $50,000.

Utah, Blue Creek—GRAIN ELEVATOR—Farmers Natl. Grain Corp., c/o Lewiston Grain Groverns, Inc., 120,000 bu. grain elevator, concrete. $50,000.

BIDS ASKED

Idaho, Lewiston—GRAIN ELEVATOR—See "Contracts Awarded."

Grain Elevators (Continued)

CONTRACTS AWARDED

Idaho, Lewiston — GRAIN ELEVATOR — Farmers Natl. Grain Corp., c/o Lewiston Grain Groverns, Inc., 130,000 bu. elevator, day labor. $50,000.

Minn., Minneapolis—GRAIN ELEVATOR—Spencer Kellogg & Sons, 822 Flour Exch., 14 steel, concrete tanks, 1,000,000 bu. capacity, 1,250,000 cu.ft. cubage, 25th St. and University Ave. S. E., to Fegles Constr. Co., Wesley Temple Bldg. Est. $100,000. Work involves 290 tons reinforcing steel, conveyor system, 1 power-operated automatic shovel (not purchased).

Mo., Kansas City — GRAIN ELEVATOR — Kansas City Southern R.R. Co., A. N. Reece, ch. engr., and Moore-Seaver Grain Co., lessee, Bd. Trade Bldg., 600,000 bu. grain elevator addition, to M. A. Long Constr. Co., 10 West Chase St., Baltimore, Md. Est. $120,000.

Tex., Happy — GRAIN ELEVATOR — W. T. Townsend & H. Toles, Amarillo, 75 ft. high, 40,000 bu. grain, elevator 100 bu. per min. or 140,000 bu. daily maximum loading capacity to Rochelle & Rochelle, Amarillo, $40,000.

POWER AND LIGHTING

PROPOSED WORK

Okla., Oklahoma City—Preliminary plans natural gas system. $400,000. M. Peshek, city clk.

Texas—West Texas Utilities Co., Abilene, improvements at San Angelo and San Angelo Dist., incl. installing 2,000 ft. watermains, single phase volt rural extension line and 3-phase 2,300 volt bank transformers and primary metering equipment for new ice plant, constructing 12 kv. line and 3-phase 2,300 volt line in South Vernon Oil Field, to serve power and lighting demands, 440 volt, 3-phase line, near Iraan, to serve Central Power equipment on Corvette Oil Co. lease, will make electric extensions at Rule, 2,300 volt single phase primary line for new customers, 2 in. gas mains to new addition at Cisco, distribution systems improved or extended, at Vernon, Medicine Mound, Jayton and San Antonio, 2,300 volt single-phase line to connect new homes at Robert E. Lee. $150,000. Work will be done partly by day labor and partly by contract. Private plans.

BIDS ASKED

Illinois—See "Contracts Awarded."

New York—July 24, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, furnishing, installing telephone emergency alarm equipment for portion Independent System of City-owned Rapid Transit Railroads from 8th Ave. and 53rd St., Manhattan, to Roosevelt Ave., Queens, and from Nassau Ave. Brooklyn, to Queens Plaza, Queens.

CONTRACTS AWARDED

Illinois — Central Illinois Pub. Serv. Co., Springfield, will build electric transmission line from Thayer to Lowder, Ill. and distribution system in Lowder, own forces. Private plans.

PARKS AND SPORTS

PROPOSED WORK

Me., Presque Isle—Town, Bd. Selectmen, public gymnasium. $25,000 or more. Engineer not selected.

Mass., Watertown—Town, Bd. Selectmen, improvements at West End Playground. $25,000.

Nev., Reno—Owner: c/o G. E. Koster, archt., Arcade Bldg., gambling casino, 100 room hollow tile hotel, 30 cottages, swimming pool, polo field, Bowers Mansion. $300,000.

N. J., Bayonne—Bd. City Comrs., City Hall, soon takes bids grading, sodding, concrete walks, steps, etc., for recreation center along Newark Bay, from 25th to 29th Sts. $200,000. W. Clarkson, city engr.

N. J., Belmar—Bd. Boro Council, Boro Hall, preliminary plans concrete municipal stadium at Memorial Field. $25,000. C. W. Birdsall, F St., engr. Noted June 18.

N. J., Princeton — Bd. Educ. playground. $25,000. C. S. Sincerbeaux, Mechanic Bldg., Trenton, archt.

N. Y., Brooklyn—Long Island Storage Warehouse, Inc., Nostrand and Gates Aves., plans by H. G. Wiseman, 33 West 42nd St., New York, skating rink, refrigeration, stores, Coney Island Ave. and Ocean Parkway. $125,000.

N. Y., New York—Bronx Beach, Long Island Sound, Inc., 55 West 42nd St., plans by P. T. Rogers, 533 East 134th St., 2 story, 73x245 ft., terra cotta bath houses, 177th St., and Longstreet Ave. $250,000.

N. Y., New York—Fordham Methodist Episcopal Church, G. F. Snyder, pastor in charge, plans by A. E. Klueppelberg, 375 East Fordham Rd., sport and gymnasum, Bainbridge Ave. and Fordham Rd. $25,000.

Pa., West View — West View Park, bath house, 100 x 200 ft. swimming pool, $100,000. **Maturity this fall.** G. Danahey, genl. mgr.

BIDS ASKED

Ill., Chicago — July 15, by South Park Comrs., 57th St. and Cottage Grove Ave., altering and constructing addition to stadium, on Lake Front, between Roosevelt Rd. and 16th St., Grant Park. $1,000,000. M. E. Connely, secy. Noted Dec. 18, 1930.

Me., Kents Hill—Maine Wesleyan Seminary and Women's College, T. W. Watkins, taking bids revised plans by Bunker & Savage, 256 Water St., Augusta, 1 story, 70 x 120 ft. and 25 x 100 ft. concrete, brick, gymnasum and locker. $70,000. Noted April, 16.

N. J., Bayonne—See "Contracts Awarded."

N. J., Morristown — J. W. O'Connor, archt., 162 East 37th St., New York, taking bids 2 story, 60 x 160 ft., stucco, steel, enclosed tennis courts, incl. insulation, grading, metal lath, plumbing, electrical and oil burning heating equipment, for P. H. Frelinghuysen, Normandie Heights. $25,000 or more.

N. Y., New York—July 14, by Park Bd., W. R. Herrick, pres. Park Bd., Arsenal Bldg., Central Park, repairing sheet asphalt and asphaltic concrete roadway pavements in parks and parkways during year 1931; shelter, band stand and comfort stations, in Union Square Park, Manhattan Boro; improving portion Franz Sigel Park, Bronx Boro.

N. Y., Rockaway—July 14, by Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, general contract bathing pavilion in Jacob Riis Park, Contr. 2.

Wash., Seattle—H. H. Ginnold, archt., Arcade Bldg., taking bids, rebuilding wood, steel natatorium, Luna Park, recently destroyed by fire, for Seattle Park Co., 1118 Alki Ave. $75,000.

CONTRACTS AWARDED

Ill., Chicago—Comrs. Cook Co., Forest Preserve Div., Chicago Ave. and Thatcher Rd., River Forest, general contract, bath house, swimming pool, to J. E. Ericeson Co., 123 West Madison Ave., $132,480. Noted June 18.

Ill., Chicago — North Shore Sanitary Dist., Waukegan, additions to sewage treatment plants at Lake Forest and North Chicago and new plant at Highland Park to A. A. Alexander & Repass Bros., 503 Franklin Blvd., Des Moines, Ia., $208,000. Noted June 4.

Mass., Boston—Park Dpt., 33 Beacon St., 1 story, brick, stone, antelope house at Franklin Park, Dorchester, to R. A. Bossi, 710 Columbia Rd., Dorchester, $47,000. Noted June 11.

Mass., Dudley—Nichols College, Business Administration, F. C. Corbin, chn. Bd. Trustees football gridiron, cinder track, tennis courts and baseball diamond, to F. X. Laliberte & Son, Inc., Main St., Southbridge.

Mass., Woburn—City, grading, drainage structures high school land, to James E. Gray, Inc., 85 Reservoir Ave., Cambridge. Est. $25,000.

N. J., Bayonne—Bd. City Comrs. will build athletic field, incl. grading, sodding, concrete work at City Park Blvd. and 16th St., day labor. $47,000. W. Clarkson, city engr. Noted June 25.

N. J., Newark—Bd. City Comrs., City Hall, general contract 1 story, basement, brick, steel addition to public bath building, Paterson and Wilson Aves., to Pellecchia Constr. Co., 50 Branford Pl.; plumbing to Jaehnig & Peoples, Inc., 221 13th Ave., Newark; heating, to F. P. Farrell, 269 Camden St., Newark; electrical work, to K. W. Electric Co., 49 Lawrence St. Est. $150,000. Noted June 25.

HEATING AND VENTILATING

PROPOSED WORK

N. Y., New York—G. and K. Realty Corp., Chrysler Bldg., aitering heating, plumbing, ventilating, electrical work, in remodeled sanitarium, 58th St. and Lexington Ave. $75,000. B. R. Swartburg, 2 West 46th St., archt.

BIDS ASKED

Mass., Falmouth — Town School Bd., taking bids heating and ventilating in grade school, $25,000. H. F. Kellogg, 378 Stuart St., Boston, archt.

Mass., Monson — Commonwealth of Massachusetts, W. A. Merrill, taking bids brick heating plant, cold storage plant, spur track construction, piping, boilers, electric stoker operation. $300,000. Ed. C. Brown Co., 77 Summer St., Boston, engrs.

N. Y., Queensboro Hill—July 13, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, heating, ventilating, plumbing, drainage, electrical work, lighting fixtures, for P. S. 120 136th St. from 58th Ave. to 58th Rd., for Bd. Educ., 500 Park Ave., New York.

CONTRACTS AWARDED

Del., Wilmington — Bd. Educ., heating and plumbing in grade school, to T. T. Welden, 916 Orange St., $87,300; electrical work, to McHugh Electric Co., 211 West 8th St., $18,341. Noted June 11, under "Schools."

Mass., Worcester—City Pub. Buildings Dpt., heating in grade school, Heard St., to Central Heating Co., 8 Garland St. $17,592; plumbing, to J. W. McInerny, 994 Main St., $8,378; electrical work, to B. Grady, all foregoing of Worcester. Est. exceeds $25,000. Noted May 7, under "Schools."

UNCLASSIFIED

PROPOSED WORK

Maine—CABLE LINE—New England Telephone & Telegraph Co., Milk St., Boston, Mass., underground and aerial cable line between Lewiston and Brunswick. $125,000. Private plans.

N. Y., New York—ELEVATOR, etc.—Wendel Estate, 175 Bway., altering incl. elevator and mechanical equipment loft and sales room, 1631 Bway. $40,000. J. B. Snook & Sons, 52 Vesey St., archts.

N. Y., New York—PLATFORM, etc.—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., plans by G. J. Luck, c/o owner, 1 story, 15 x 766 ft. platform and canopy for chicken car unloading, vicinity 125th St. and Hudson River.

New York—TELEPHONE CONSTRUCTION—New York Telephone Co., 140 West St., New York authorized $13,266,500 for new construction throughout state.

Pa., Phila. — SUMP PUMPS — Dpt. City Transit, City Hall Annex, C. E. Myers, dir., withdrew bids to have been opened June 23, Contr. 314, Broad Street Subway, West Philadelphia, Branch, incl. 2 sump pumps, Callowhill St. and 3 sump pumps Filbert St. Will readvertise. Noted June 11.

Tex., Corpus Christi—TANKS—Pure Oil Distributing Co. five 10,000 gal. tanks for gasoline storage. $35,000. Work will probably be done by day labor. Private plans.

Va., Petersburg—POLICE and FIRE ALARM SYSTEM—See "Sewers."

Ont., Chatham—GAS PIPE LINE—Union Natural Gas Co., E. C. Steel, engr., extending 10 mi. pipe line between Alvinston and Watford and later 20 mi. to Arkona and Forest.

BIDS ASKED

Calif., Los Angeles—CONDUIT—Los Angeles Co. taking bids rein.-con. Unit incl. 11,500 cu.yd. excav., 2,000 cu.yd. backfill, 1,450 cu.yd. "A" rein.-con. and three cu.yd. "B" mass concrete, fencing, in 8th St., between Anita St. and Harding Ave., and Harding Ave., San Fernando.

N. Y., New York—TRACKS, etc.—July 14, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., tracks and contact rail, incidental work for Rapid Transit R.R., Route 106, Sects. 1 to 7 (inclusive), Manhattan and Bronx Boros.

N. Y., Dannemora—MAIN GATE—July 16, by Commissioner Correction, State Office Bldg., Albany, construction and electrical work for new Main Gate, Clinton Prison; adv. E. N.-R. July 9.

Texas and Oklahoma—GAS PIPE LINE—See "Contracts Awarded."

Tex., Laredo—SPEEDWAY—See "Airports."

CONTRACTS AWARDED

California—GAS PIPE LINE—Southern Fuel Co., 740 South Bway., Los Angeles, welding 106 mi. pipe line from Glendale to Valve 32 of Southern California Gas Co. Taft-Los Angeles line to Welding Eng. Co., Bartlesville, Okla., $125,000.

Mass., Boston—PLATFORM—City, Library Dpt., concrete platform at Central Library, Copley Sq., to Blakeslee-Rollins Corp., 6 Beacon St., $56,070.

Mass., Chelsea — TRESTLE — Metropolitan Coal Co., 20 Exchange Pl., Boston, 30 x 245 ft., timber, concrete trestle, to John B. Proctor Co., Inc., 250 Stuart St., Boston. Est. $30,000.

Mass., Springfield—PLUMBING SYSTEM—Commonwealth of Massachusetts, Hampden Co., Comm., installing plumbing system for cells, Hampden Co. Jail, to A. E. Mayer, 419 Main St., $22,325. Est. $25,000.

N. H., Laconia—COAL SHEDS, etc.—State, Laconia State School, concrete coal sheds and track hoppers at State School, to Guay & Tardif, 96 Summer St., Laconia. Noted June 25.

N. J., West New York—WIDENING, etc.—Bd. City Council, Municipal Bldg., widening, improving Jackson St. from 13th to 15th Sts., to Jersey State Constr. Co., Bergen Ave., at 84.5% $30,000 appropriation. Noted June 25.

N. Y., Batavia—TUNNELS—Superintendent Standards & Purchase, Capitol, Albany, tunnels for New York State School for Blind, to L. C. Whitford, Wellsville, $16,200. Noted June 11.

N. Y., Creedmoor — ELEVATOR, etc. — Dpt. Mental Hygiene, State Office Bldg., Albany, electric elevator and dumbwaiters for Creedmoor Inv. Brooklyn State Hospital, to A. B. See Elevator Co., 52 Vesey St., New York. $31,000. Noted May 7.

N. Y., New York — SPECIAL WORK — B-t. Transportation, J. H. Delaney, chn., 250 Hudson St., special work, rails, frogs, switches for Rapid Transit R.R., Order 58-9, to Loram Steel Co., 350 5th Ave., $46,772; and to William Wharton, Jr., 110 East 42nd St., $42,950. Noted June 18.

Pa., Phila. — PLUMBING, etc. — Dpt. City Transit, City Hall Annex, C. E. Myers, dir., Contr. 315, plumbing and sewage ejectors for Ridge Ave. and 8th St., plumbing and sewage ejectors equipment for sub-stations, West Philadelphia Branch and in signal tower Fairmount Sta. of North Broad St. Subway, to Nicholas Connolly, 1404 North 18th St., $28,028. Noted June 11.

Texas and Louisiana—PIPE LINE—Humble Oil & Refining Co., Humble Bldg., Houston and Humble, 100 mi. 8 and 10-in. welded joint pipe for pipe line between Longview, Tex., to Shreveport, La., to Youngstown Sheet & Tube Co., Stambaugh Bldg., Youngstown, O., and National Tube Co., Youngstown, O., and Frick Bldg., Pittsburgh, Pa. Total est. $1,350,000. Noted June 25.

Texas and Oklahoma—GAS PIPE LINE—Panhandle Light & Power Co., c/o C. R. Stahl, mgr., Borger, Tex., 74 mi. 8 in. gas pipe line

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Unclassified (Continued)

between Dumas, Tex., and Boise City, Okla., own forces. $240,000. Private plans. Noted May 28.

MATERIALS

BIDS ASKED

REINFORCING STEEL—**Los Angeles, Calif.**—Bd. Comrs. Los Angeles Co. taking bids 100 lb. 1 in., 100 lb. ¾ in., 14,000 lb. ¾ in., 100 lb. ⅝ in., 1,350 lb. ½ in., 2,800 lb. ⅜ in., 100 lb. ¼ in. round deformed, 100 lb. ¼ in. square deformed reinforcing steel for rein.-con. storm sewer in San Pasqual Wash., from Alhambra Ave., 100 ft. up stream.

WATER PIPE—**Orange, Calif.**—City in market 4,000 ft. 6 in. and 500 ft. 8 in. c.i. water pipe. Former bids rejected. Noted June 19.

CRUSHED ROCK, etc.—**Oroville, Calif.**—July 17, by Supervs. Butte Co., 35,000 tons crushed rock, gravel and sand. J. A. Baumgarner, co. surv.

ASPHALT PLANKING, etc.—**Minneapolis, Minn.**—July 13, by F. S. Gram, city purch. agt., 3,330 sq.yd. asphalt planking, 2x8; also rail filler, 2,144 ft. each of 2 kinds. N. W. Elsberg, city engr.

GRAVEL—**Greenville, Miss.**—July 13, at office Bd. Mississippi Levee Comrs., 5,000 tons road gravel, f.o.b. cars Glen Allen. E. Kellner, secy.

COARSE AGGREGATE—**New York, N. Y.**—July 16, by S. Levy, pres. Manhattan Boro, Municipal Bldg., 3,500 cu.yd. coarse aggregate.

WATER PIPE, etc.—**Grove City, Pa.**—July 10, by Boro. Boro Bldg., 100 tons 4- to 12-in. c.i. water pipe, with necessary valves, fittings, sand crushed stone, or slag, reinforcing steel, sewage pump, venturi meter, mechanical clarifier equipment.

CONTRACTS AWARDED

PIPE—**Burbanks, Calif.**—City Council, 1,000 ft. 8 in. Class B c.i. pipe to C. G. Claussen & Co., 117 West 9th St., Los Angeles, $2,548; 3,000 ft. 6 in. and 3,400 ft. 10 in. c.i. pipe, to U. S. Pipe & Fdry. Co., 2326 East 8th St., $1,542 and $3,570 respectively. Grand total, $7,660.

WATER PIPE—**Vallejo, Calif.**—A. Edgcumbe, city clk., 16- to 24-in. (B&S) c.i. water pipe, to Amer. Cast Iron Pipe Co., Balboa Bldg., San Francisco, $28,005.

GRANITE EDGESTONES—**Boston, Mass.**—City, Supply Dpt., furnishing granite edgestones and blocks to Dpt. P. Wks., as specified, to T. H. McVoy, 53 Market St., Brighton, $19,043.

GRAVEL—**Omaha, Neb.**—Douglas Co., 155,500 tons road gravel, to J. J. Parks Co., 205 Bankers Saving Bank, at $1.54 per ton.

CEMENT, etc.—**Trenton, N. J.**—New Jersey State Hy. Dpt., 2,100 bbl. portland cement, to Vulcanite Portland Cement Co., 320 Park Ave., New York, at $2.14 bbl.; 900 tons sand and 1,485 tons concrete, to New Jersey Sand & Gravel Co., Asbury Park, $4,570.

STEAM CINDERS — **Brooklyn, N. Y.** — H. Hesterberg, pres. Brooklyn Boro, Boro Hall, 15,000 steam cinders, to M. F. Hickey Co., foot 6th St., at $0.835 per cu.yd., total $12,525. Noted June 4.

BITUMINOUS MATERIAL—**Wisconsin**—State Hy. Comm. and Hy. Coms. Marinette, Oconto, Shawano, Counties, Green Bay, to Kopper Products Co., Koppers Bldg., Pittsburgh, Pa., 115,000 gal. Type B tar, Oconto Co., $8,510, 521,000 gal. Marinette Co., $38,554, 150,000 gal., Shawano Co., $11,100; to Standard Oil Co. of Indiana, Green Bay, 115 000 gal. Type E. asphalt Oconto Co. $7,475, 521,000 gal. Marinette Co. $33,865, 150,000 gal. on Keshena-Phlox Rd. $9,750, 100,000 gal. Type C asphalt for Keshena-Langlade Rd., $4,300, both Shawano Co.; to Sarrington Milling Co., Delton, applying 115,000 gal. material in Oconto Co. $1,840. Grand total $115,394. Noted June 18.

CABLE—**Hamilton, Ont.**—Hamilton Hydro-Electric System, 12 King St. E., furnishing 18,000 lin.ft. cable to Standard Underground Cable Co., Hamilton, at $1.4175 per lin.ft.

EQUIPMENT

PROPOSED WORK

TRACTOR—**Huntington Beach, Calif.**—Huntington Beach Union High School Dist., E. R. Bradbury, clk., purchasing 10 hp. tractor, track laying type, caterpillar or equal.

PRIMARY METERING EQUIPMENT, etc.—**Texas**—See "Power and Lighting."

BIDS ASKED

STEAM SHOVEL—**Milton, Mass.**—J. H. Ferguson, Allerton St., in market steam shovel.

FOREIGN

Argentina, Cordoba — Nov. 12, by Ministry Pub. Wks., constructing San Rogue Dam.

England, London — Tate Gallery, c/o J. Duveen, Milbank, bids late in August, art gallery wing. $250,000. John Russell Pope, 542 5th Ave., New York, archt.

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Italy — Municipality of Bologna plans refrigerated warehouse, distribution for meats, dairy products, to exceed $1,000,000; Municipality of Naples plans refrigeration, distribution for fruits, vegetables, to exceed $1,000,000, **maturity indefinite**; municipality of Palermo, refrigerated warehouse, to exceed $1,000,000; and Municipal Govt. of Milan, refrigerated and distribution warehouses, to exceed $1,000,000.

New Zealand, Wellington—Aug. 19, by Secretary Posts & Telegraph Dpt., private automatic branch exchange equipped with 30 PABX subscribers lines.

New Zealand, Wellington — Aug. 25, by Ministry P. Wks., storage battery complete for Mangaho Power Scheme, capacity 150 amperes.

New South Wales, Sydney — Aug. 31, by Secretary Dpt. P. Wks., supply, erection, operation and maintenance 2 vacuum pumps and electric motors for Sowest Tablelands Water Supply.

Commercial Buildings

RESIDENTIAL

BIDS ASKED

Calif., Oakland—See "Contracts Awarded."

N. J., Asbury Park—C. E. Van Wickle, 501 Grand Ave., soon takes bids on revised plans general contract 6 story, basement, brick, steel, Grand and 4th Aves. $175,000. Former bids rejected. Tillion & Tillion, 48 West 48th St., archts. Noted June 11.

N. J., Woodcliff—See "Contracts Awarded."

N. J., Woodridge (br. Rutherford)—See "Contracts Awarded."

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., Long Island City — See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Oakland—L. J. Newton, 1130 1st Ave., 9 story, basement, rein.-con., steel, separate contracts. $250,000. T. Keenan, 1440 Bway., archt. Noted June 19.

Fla., Miami Beach—W. F. Whitman, 732 Federal St., Chicago, Ill., general contract 3 story, 120 x 160 ft., to Meade Constr. Co., Miami Beach, plumbing and heating, to A. Orr, Miami Beach. Noted Mar. 26.

Mass., Boston—Ritz Carlton Trust, E. N. Wyner, treas., 18 Tremont St., altering and constructing 1 story top additon, to hotel, ball room, dining hall and roof garden, steel, glass, to United Constr. Co., 18 Tremont St. Est. $300,000.

N. J., Woodcliff—R. Rinaldi, 516 Robinson St., 10 story, basement, brick, steel, Boulevard East, separate contracts. $250,000. E. Buehler, 1765 Boulevard East, archt.

N. J., Woodridge (br. Rutherford)—P. Leone, 57 Hamilton Ave., 3 story, basement, brick, steel, Hackensack St. and Marlboro Rd., separate contracts. $150,000. L. Vivoli, 593 Palisade Ave., Grantwood, archt.

N. Y., Brooklyn—Betann Realty Corp., S. Leider, pres., 905 Linden Blvd., 6 story, 114 x 200 ft., St. Johns Pl. and Classon Ave., separate contracts. $400,000. M. Rothstein, 186 Joralemon St., archt.

N. Y., Brooklyn—Calmpack Building Corp., 16 Court St., 6 story, 90 x 100 ft., Ada and Brightwater Courts, separate contracts. To exceed $150,000. Cohn Bros., 215 Montague St., archts.

N. Y., Brooklyn—Corporation, c/o M. Kalb, 26 Court St., 6 story, 84 x 150 ft., Gatling Pl. and 90th St., separate contracts. $220,000. M. N. Weinstein, 93 Court St., archt.

N. Y., Brooklyn—Corporation, L. Kopple, 530 West 113th St., 6 story, 110 x 140 ft., Ocean Parkway near Estate Rd., separate contracts. $280,000. M. N. Weinstein, 93 Court St., archt.

N. Y., Brooklyn—Corporation, c/o L. Schumer, 190 Joralemon St., 6 story, 130 x 140 ft., 67th St. and 18th Ave., separate contracts. $260,000. J. J. Millman, 67 Court St., archt.

N. Y., Brooklyn—Elton Impvt. Co., c/o M. Pickman, 315 East 6th St., 6 story, 84 x 280 ft., Hoff St. and Ocean View Ave., separate contracts. $450,000. J. M. Ricca, 16 Court St., archt.

N. Y., Brooklyn—R. P. Murphy, 675 57th St., 6 story, 60 x 90 ft., Narrows and Bay Ridge Aves., separate contracts. $150,000. Burke & Olsen, 32 Court St., archts.

N. Y., Brooklyn — Twenty-Six Court Street Corp., and Chanin Bros. Constr. Co., 122 East 42nd St., New York, 25 story hotel, State, Court and Clinton Sts., separate contracts. $1,500,000. **Maturity late in fall.** Noted Apr. 30.

N. Y., Long Island City—Sunnyside Corp., c/o Franklin, Bates & Heindsmann, archts., 2526 Webster Ave., New York, 6 story, Skillman Ave. and 51st St., separate contracts. $170,000.

N. Y., New York—Beckmer Realty Co., 496 East 138th St., L. Grodsky, pres., 6 story, 75x 96 ft., Morris Ave. and 173rd St., separate contracts. $250,000. H. Ginsberg, 205 East 42nd St., archt.

N. Y., New York—Corporation, c/o A. Ancowitz, 1975 Lafontaine Ave., 6 story, basement, 62x86 ft., 192nd St. and University Ave., separate contracts. $150,000. O. Goldschlag, 55 West 42nd St., archt.

N. Y., New York—Corporation, c/o A. Magistro, 512 East 187th St., 6 story, Montgomery and Tremont Aves., separate contracts. $150,000 G. W. Swiller, 4215 3rd Ave., archt.

N. Y., New York—Russell Homes Corp., 122 East 42nd St., 2 story, basement, Yates and Mace Aves., separate contracts. $180,000. Murgatroyd & Ogden, 285 Madison Ave., archts.

Pa., Jenkintown — Jenkintown Hall Corp., 1540 Wood St., Phila., 6 story, basement, 120 x 160 ft., brick, steel, rein.-con., plain found., Greenwood Ave. and Florence St., to A. Gilchrist, 1420 Chestnut St., Phila. Noted Mar. 26, under "Contracts Awarded."

CLUBS

PROPOSED WORK

N. J., Jersey City—Polish American Democratic Club, 176 Pavonia Ave., 2 story, basement, brick, steel, Liberty and St. Pauls Aves. $150,000. Bids in. Project in abeyance. A. Davis, 140 Montgomery St., archt. Noted June 4.

CONTRACTS AWARDED

Calif., San Francisco—Y. W. C. A., 620 Sutter St., 7 story, basement, steel, concrete club and hotel, to K. E. Parker Co., 135 South Park St., San Francisco, $250,000. Noted Jan. 1.

Pa., Pittsburgh—Geisler & Smithyman, 335 Boulevard of Allies, Islam Grotto Temple, 2 and 6 story, basement, 87 x 140 ft., brick, steel, terra cotta, ornamental iron, Moorish type architecture, 1,000 seating capacity auditorium, stage, to R. E. Harris, Clark Bldg. Est. $150,000. Noted June 11.

HOSPITALS

PROPOSED WORK

Mass., Waverly—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, brick, steel hospital unit for treatment of contagious diseases at Walter Fernald School. $150,000.

Mass., Westfield—Noble Hospital, 105 West Silver St., M. Smylie, supt., rejected bids altering and constructing 4 story, basement, 50 x 125 ft., brick, steel hospital addition, plain found. $300,000. M. B. Harding, 6 Main St., archt. Noted June 11.

N. Y., Brooklyn—Beth Moses Hospital, 404 Hart St., hospital. $1,000,000. **Maturity in spring or later.** C. B. Meyers, 31 Union Sq., New York, archt. Noted Dec. 12, 1929.

N. Y., Brooklyn—Dpt. Hospitals, Municipal Bldg., New York, bids in September, general contract addition Coney Island Hospital, Ocean Parkway. $150,000. Dodge & Morrison, 160 Pearl St., New York, archt. Noted Apr. 2.

N. Y., Brooklyn—Dpt. Hospitals, Municipal Bldg., New York, bids late in August, general contract nurses' home and training school, at Kings Co. Hospital. $1,625,000. LeRoy P. Ward, 205 East 42nd St., New York, archt. Noted Mar. 12.

N. Y., Brooklyn—Dpt. Hospitals, Municipal Bldg., New York, bids in September, general contract psychopathic building addition to Kings Co. Hospital. $150,000. C. B. Meyers, 31 Union Sq., New York, archt. Noted Apr. 28.

N. Y., Brooklyn—Harbor Hospital, Cropsey and 23rd Aves., 4 story, basement hospital addition. Project in abeyance until winter. P. M. Erickson, 885 Flatbush Ave., archt. Noted Jan. 22.

N. Y., Brooklyn—Hospital of Holy Family, 283 Hicks St., 6 story, 100 x 150 ft., brick, steel hospital, plain found. Projection abeyance. Crow, Lewis & Wick, 200 5th Ave., engrs. and archs. Noted Jan. 15.

N. Y., Brooklyn—Shore Road Hospital, Shore Rd., hospital addition, Shore Rd. and 91st St. Project indefinitely in abeyance. $250,000. Noted Jan. 22.

N. Y., Brooklyn—Swedish Hospital, Rogers Ave., general contract hospital addition. $250,000. Crow, Lewis & Wick, 200 5th Ave., New York, archts. Project indefinitely in abeyance. Noted Jan. 15.

Pa., Phila. — Orthopedic Hospital plans by Bissell & Sinker, Archt. Bldg., removing hospital from 17th and Summer Sts. to University of Pennsylvania Grounds.

Pa., Torrence—Torrence State Hospital, C. R. McKinnis, supt., new buildings, improvements to state hospital. $515,000.

Pa., Warren—Warren State Hospital, H. W. Mitchell, supt., new buildings, improvements to state hospital. $290,000.

Tex., San Antonio — State (Institution) of Texas, San Antonio State Hospital, c/o Dr. S. Johnson, hospital improvements, incl. 2 adjoining dormitories, laundry equipment, kitchen and dining room equipment. $195,000 appropriated.

Tex., Wichita Falls—Wichita State Hospital, hospital buildings, incl. ward, hospital, superintendent's residence. $162,500 appropriated.

Ont., Hamilton—Mountain General Hospital, plans by W. P. Witton, 7 Hughson St. S., brick, stone maternity building. $300,000. Noted Oct. 16.

Que., Verdun—Verdun Protestant Hospital, C. A. Porteus, supt., 2 story, brick, steel hospital addition. Est. $250,000.

BIDS ASKED

Calif., San Francisco—July 15, by S. J. Hester, secy. Bd. P. Wks., structural steel for 4

Hospitals (Continued)

story, basement, rein.-con. health center building, Civic Center, for City and San Francisco Co. $52,500. Total $850,000. Noted Aug. 21.

N. Y., Brooklyn—Dpt. Hospitals, Municipal Bldg., New York, bids about Aug. 1, general contract emergency building, refrigeration at Coney Island Hospital. G. M. McCabe, 96 5th Ave., New York, archt. Noted Mar. 26.

N. Y., Buffalo—July 15, by Kidd & Kidd, archts., 524 Franklin St., general contract 4 story hospital, High St., for Buffalo General Hospital, High St. $400,000. Noted May 21.

O., Bucyrus—July 21, by City, H. M. Linser, clk., 3 story, basement, 39 x 66 x 104 ft., brick, steel, concrete hospital. $150,000. Thomas D. McLaughlin & Associates, Lima, archts.

CONTRACTS AWARDED

Ga., Waycross—Ware Co., c/o J. T. Watt, chn. Building com., general contract 3 story, basement, brick, terra cotta, stone, rein.-con., 40 x 120 ft. and 40 x 64 ft. hospital, to V. C. Parker, Waycross; plumbing and heating to W. Denson, 2916 Olga Pl., Jacksonville, Fla.; electrical wiring, to Byck Electric Co., 139 Bull St., Savannah. Est. $150,000. Noted May 21.

Ind., Ft. Wayne — Bd. Supervs. Allen Co., general contract Irene Byron Tuberculosis Sanitarium addition, rein.-con., brick, steel, stone, to Schinnerer & Truemper, 1500 Westover St., Ft. Wayne. Est. $150,000. Noted May 21.

Ia., Iowa City—Schmidt, Garden & Erickson, archts., 104 South Michigan Ave., Chicago, Ill., masonry and carpentry work for 1 and 2 story, 121 x 126 ft., hospital addition, to R. F. Conlon, Dubuque, for Sisters of Mercy; plumbing and heating, to Tom Connell Co., Iowa City; elevators, to A. Meyers, Oshkosh, Wis. Est. $150,000. Noted June 4.

Mass., Waverly—McLean Hospital, K. J. Tillotson, supt., 4 story, basement, brick, steel nurses' home, to Walsh Bros., 150 Hampshire St., Cambridge. Est. $150,000.

N. Y., Brooklyn—Dpt. Hospitals, Municipal Bldg., New York, general contract mortuary and garage at Coney Island Hospital, to Silvestri Bros., 631 East Tremont Ave., New York, $104,900; plumbing, to J. M. Kandel, 992 2nd Ave., New York, $37,965; heating, to Dierks Heating Co., 210 East 31st St., New York, $11,997. Grand total $154,862. Noted Apr. 30.

O., Cleveland—City, D. E. Morgan, mgr., 4 story, 40 x 250 ft., rein.-con. tuberculosis sanitorium addition, Warrensville Farm, to Sam W. Emerson Co., 1836 Euclid Ave., $171,050. Noted June 4.

Tex., Galveston—R. L. White, c/o State University, Rustin and Galveston, 4 story, brick, stone nurses home, to Joseph E. Morgan & Son, El Paso. Noted Apr. 16.

CHURCHES

PROPOSED WORK

Ala., Birmingham — Canterberry Church, formerly known as Union Hill Church, plans by Denham & Denham, Comer Bldg., stone, English Gothic type church on 136 x 216 ft. site Montevallo Rd.

Calif., San Diego—F. L. Hope, Jr., archt., Bank of America Bldg., soon takes bids part 2 and 3 story, basement, 160 x 200 ft., rein.-con. convent, Hawley Blvd., for Carmelite Sisters, San Diego. $175,000. Noted Feb. 5.

Calif., West Los Angeles (br. Los Angeles)—Roman Catholic Bishop Diocese of Los Angeles and San Diego Church of St. Paul the Apostle plans by Newton & Murray, 502 Architects Bldg., Los Angeles, 1 and part 2 story, 100 x 120 ft. rein.-con., steel church, Selby and Ohio Aves. $500,000.

Conn., Waterbury — West Side Methodist Episcopal Parish, R. F. Shinn, pastor, plans by Bureau of Architects, 1701 Arch St., Phila., Pa., and takes bids in August, brick, stone church, West Main St. $150,000. Noted Aug. 7.

Mass., Leicester—St. Joseph's Roman Catholic Parish 753 Main St., plans by J. W. Donohue, 1200 Main St., Springfield, and soon takes bids general contract 3 story, brick stone convent, Main St. To exceed $150,000.

N. J., Elizabeth—L. Quien, Jr., archt., 229 Broad St., soon lets general contract 1 story, basement, brick, steel, 858 Jersey Ave., for Swedish Lutheran Church, D. Jacobsen, chn. building comn., 223 Rahway Ave. $150,000. Noted June 18.

N. J., West New York—First Church of Christ Scientist, J. E. Orth, pres. Bd. Trustees, 208 49th St., Union City, will not build 2 story, basement, brick, steel church Blvd. E and 10th St. $150,000. Project abandoned. Noted Feb. 5.

N. Y., Brooklyn—Roman Catholic Church of Immaculate Heart of Mary, 119 East 4th St., general contract 73 x 169 ft. church, Fort Hamilton Parkway and East 4th St. $300,000. Project indefinitely in abeyance. G. H. Streeton, 9 East 47th St., New York, archt.

N. Y., Brooklyn—Church of Our Lady of Refuge, Ocean and Foster Aves., general contract church. $150,000. **Maturity in Spring.** McKenna & Irving, 15 Park Row, New York, archts. Noted Dec. 4.

N. Y., Brooklyn—Evangelical Lutheran Church of Good Shepard 148 74th St., church. $300,000. Project in abeyance. Cherry & Matz, 441 Lexington Ave., New York, archts. Noted Jan. 15.

Pa., McKeesport—Central Presbyterian Congregation, J. L. Hoyt, in charge building comn., 1916 Soles St., stone church on 35 x 102 ft. site, Versailles Ave. and Union St. $150,000. **Maturity probably this year.** Architect not selected.

Pa., Pittsburgh—German Evangelical Congregation, W. C. Hirt, pres. church council, 2317 Sidney St., H. G. Appel, chn. building comn., 744 Lillian St., sketches by C. J. and Christ Rieger, 204 Clausner Bldg., 1 story, basement, brick, stone sunday school, gymnasium in basement, Ormsby Ave. $200,000.

R. I., Warwick—Methodist Episcopal Church plans by Woodbury & Stuart, 581 Boylston St., Boston, Mass., 1 story, basement, brick, stone, Ann and Fair Sts. $35,000. This conrects report in June 25 issue.

Que., Les Eboulements—A. Tremblay, pastor, new Roman Catholic Church. $150,000.

BIDS ASKED

Ill., Wilmette—Childs & Smith, archts., 720 North Michigan Ave., Chicago, Ill., bids about July 20, 1 story, 50 x 130 ft., brick, stone church, 9th St. and Greenleaf Ave., for 1st Presbyterian Church. $165,000.

Ind., Ft. Wayne—July 10, by St. Vincents Orphans Home, J. F. Noll, pastor, rein.-con., brick orphans home, church, school, power plant, chapel, Wells and Archer Sts. $500,000. A. M. Strauss, 415 Cal-Wayne Bldg., archts. Noted June 4.

N. J., Newark—Franklin Memorial Church, J. Ether, pastor, Maple Ave., bids about Aug. 1, general contract 2 story, basement, brick, steel, Maple and Keer Aves. $150,000. F. Y. Parsons, 949 Bway, New York, archt. Noted Apr. 9.

N. J., Newark — W. B. Willis, archt., 171 Madison Ave., New York, bids about Aug. 1, general contract 2 story, basement, 80 x 120 ft., brick, steel church, 110 ft. tower, James and Washington Sts., for Second Presbyterian Church, 294 Mount Prospect Ave. $200,000. Noted June 4.

CONTRACTS AWARDED

Calif., Los Angeles—I. A. McCarty, 1264 West Adams Blvd., 65 x 142 ft., rein.-con., steel, cast stone, Class A church, Sunday school rooms, auditorium, and kitchen, to Escherich Bros., 234 West 37th St., $119,295; art stone, to Wm. Smith, Pasadena. Total est., $200,000.

Conn., Bridgeport—St. Cyril's and St. Methodius Parish, G. Panik, pastor, 3 story, 45 x 62 ft. and 45 x 80 ft., rein.-con., brick, steel convent, to W. J. Shaughnessy, Jr., 555 Grant Ave. Est. $150,000. Noted June 18.

Conn., Hartford — Memorial Baptist Parish, N. P. Clark, chn. building com., brick, stone church, steeple, to N. P. Clark, 350 Ridge Rd., Wethersfield. $150,000 cost plus percentage basis. Noted June 25.

Mass., Pittsfield—St. Mark's Roman Catholic Parish M. J. Leonard, pastor, 1 story, basement, concrete, granite, steel church, plain found., to J. R. Hampson & Co., Inc., 184 North St. Est. $150,000 or more Noted June 11.

N. Y., Blauvelt—Sisters of Third Order of St. Dominic, 5 story, basement, motherhouse, chapel, to Frank A. O'Hare Co., 270 Madison Ave., New York. Est. $600,000.

SCHOOLS

PROPOSED WORK

Calif., Riverside — University of California, plans by G. S. Underwood, 3646 West 9th St., rein.-con. college. $150,000.

Calif., San Diego—State of California plans by W. H. Wheeler, California Bank Bldg., group college buildings, incl. physical educational building $177,000, science hall, and improvements to grounds $26,800.

Colo., Denver—Bd. Educ., H. Anderson, deputy supt. schools, replacing 3 buildings with Greenlee School, 2 story, rein.-con. incl. 2 science rooms, 2 art rooms, library, auditorium, gymnasium, English Goethic design, West 12th Ave. and Kalamath St. $225,000. **Maturity about October.**

Conn., Bridgeport—City, Bd. Educ., sketches by F. J. Dixon, State St., Junior High school, brick, steel, North End. $650,000.

Conn., Hartford—City, Northwest School Dist., R. H. French, brick, steel school addition, Holcomb St. $150,000. Architect not selected.

Conn., New Britain—Daughters of Mary of the Immaculate Conception, Gold St., fireproof convent, Gold St. $150,000. Architect not selected.

Conn., New London—St. Joseph's Parish, Squire St., parochial school. $150,000. Architect not selected.

Del., Wilmington—Guilbert & Betelle, archts., 20 Branford Pl., Newark, N. J., soon takes new bids School 25, 2 story, basement, brick, steel, plain found., for Delaware School Foundation, Du Pont Bldg. $150,000. Former bids rejected. Noted June 11.

Ga., Athens — University of Georgia, c/o C. M. Snelling, chancellor, plans by Hentz, Adler & Shutze, 1330 Candler Bldg., Atlanta, Brown Memorial Dormitory, 3 story, brick, tile, stone, concrete found. $150,000.

Ga., Emory University—Emory University, c/o A. Cox, plans by Hentz, Adler & Schultz, Candler Bldg., Atlanta, 2 story, basement, gymnasium. $250,000. Robert & Co., Bona Allen Bldg., Atlanta, engrs.

Ind., Milgrove—School Comrs. plans by E. I. Brown, 309 1st Natl. Bank Bldg., Ft. Wayne, 2 story, basement, brick, steel school. $150,000.

Mass., Belchertown—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, sketches by Kendall, Taylor & Co., 209 Columbus Ave., Boston, industrial building at State School. $52,000 appropriated.

Mass., Cambridge—City, Mayor's Office, Municipal Bldg., plans by R. H. Doane, 60 Batterymarch St., Boston, brick, steel technical high school, Cambridge and Felton Sts. $1,500,000. Noted Apr. 30.

Mass., Dedham—Town, J. C. Anthony, supt. schools, 2 story, basement, brick high school addition, Bryant St. $300,000. Architect not selected.

Mass., Hamden—Towner & Sellew Associates, archts., 329 Main St., Middletown, rejected bids June 8, 1.5 story, 56 x 115 ft. and 40 x 60 ft., brick, cast stone school and community building, for Town. $125,000-$150,000. No further action until 1932. Noted June 4.

Mass., Mansfield—Town, L. Woods, supt. schools, plans by L. Clough, 932 Little Bldg., Boston, Junior-Senior High School, bids in July, 2 story, basement, brick, steel $150,000. Noted Feb. 5.

Mass., Swampscott—Town, H. S. Baldein, chn. building comn., 2 story, basement, irregular sized, brick, steel, limestone high school, Forest Ave. $350,000. Voted to postpone action during 1931. Cram & Ferguson, 248 Boylston St., Boston, archts.

Mass., Waverly — Commonwealth of Massachusetts, Dpt. Mental Diseases, plans by Kendall Taylor & Co., 209 Columbus Ave., Boston, 2 brick, steel nursery units at Walter E. Fernald School. $150,000.

Mass., Waverly—Commonwealth of Massachusetts, Dpt. Mental Diseases, Room 109, State House, Boston, sketches by Desmond & Lord, 1 Beacon St., Boston, 2 story, brick assembly building, $75,000; sketches by James H. Ritchie & Associates, 250 Stuart St., Boston, 3 story, brick, steel dormitory, $150,000. Noted June 4.

Mass., Wellesley—Town, School Bd., sketches by R. C. Sturgis, 120 Boylston St., Boston, brick, stone high school addition, Kingsbury St. $150,000.

Mass., West Roxbury (sta. Boston)—City of Boston, Dept. School Buildings, soon takes bids 2 story, basement, brick, stone school, plain found., Temple, Perham and Vermont Sts. $200,000. H. R. Duffie, 364 Belgrade Ave., Roslindale, archt.

N. J., Clifton—Bd. Educ., High School, 2 story, basement, brick, steel school, Conrad Ave., between Broad and Grove Sts. $150,000. **Maturity in September.** Noted June 11.

N. J., Elizabeth—Bd. Educ., 417 South Broad St., 2 story, basement, brick, steel, South St. $150,000. **Maturity probably in September.** H. B. Brady, Inc., 333 North Broad St., archt. Noted May 21.

N. J., Lodi—Bd. Educ., A. Cody, pres., Union St., sketches by D. P. Conte, 166 Harrison Ave., Junior and Senior High School, 2 story, basement, brick, steel, Westervelt Pl., First and Park Sts. $450,000. Noted Dec. 8.

N. J., New Brunswick—Bd. Educ., Junior High School, Livingston, rejected bids June 15, general contract Senior High School, 2 story, basement, brick, steel, rein.-con. $400,000. A. Merchant, 1 Elm Ave., archt. Noted June 4.

N. J., Nutley—Bd. Educ., Franklin Ave., Junior High School, 2 story, basement, brick, steel, rein.-con. $150,000. **Maturity probably soon.** Architect not selected.

N. J., Palisades Park — Joint Bd. Educ., Ridgefield, Fairview and Palisades Park, E. Rielly, trustee, Fairview, 2 story, basement, brick, steel regional high school, Morsemere Sect. $150,000. **Maturity indefinite.** Architect not selected.

N. J., Pompton Lakes — Bd. Educ., C. E. Walton, superv. principal, Municipal Bldg., sketches by Hacker & Hacker, 201 Main St., Fort Lee, Senior High School, 2 story, basement, brick, steel. $150,000 or more. Noted May 21.

N. J., Rahway—Bd. Educ., High School, will not build 2 story, basement, brick, steel, rein.-con. school, Hamilton St. $250,000. Project abandoned. Noted May 28.

N. J., Ridgewood — Bd. Educ., J. Kollmar, secy., Beech St., will not build Junior and Senior High School, 2 story, basement, brick, steel. $150,000. Project abandoned. Fanning & Shaw, 49 Ward St., Paterson, archts. Noted Apr. 9.

N. J., River Edge—Bd. Educ., Boro Hall, sketches by J. L. Tillack, 173 Main St., Hackensack, 2 story, basement, brick, steel school. $150,000. Noted June 4.

N. J., Rutherford—T. J. Folks, archts., 488 East 33rd St., Paterson, soon lets contract 2 story, basement, 100 x 155 ft., brick, steel school, Ames Ave. and Chestnut St. for St. Mary's Roman Catholic Church, C. W. Tichler, pastor, 91 Home Ave. $200,000. Noted July 2.

N. J., West Fort Lee—Bd. Educ., J. C. Abbott, secy., High School, Fort Lee, 2 story, basement, brick, steel, rein.-con., Main and Linwood Aves. $150,000. **Maturity probably soon.** Architect not selected.

N. J., West New York—Bd. Educ., Municipal Bldg., altering and constructing 2 story, basement, brick, steel addition to school, 11th and Polk Sts. $150,000. **Maturity probably soon.** Architect not selected.

N. Y., New York—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, addition to P. S. 34, Bronx Boro. $200,000.

O., Cincinnati—Bd. Educ. plans by Kruckemeyer & Strong, 405 St. Paul Bldg., 3 story, brick, rein.-con. school. $175,000.

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Schools (Continued)

Pennsylvania—State of Pennsylvania, Dpt. Pub. Instruction, J. N. Rule, supt., Harrisburg, sketches Normal Schools and State Teachers' Colleges. $915,000.

Pa., Glenshaw—Bd. Educ., F. C. Koussman, pres., plans by C. C. Compton, 4th and Thompson Sts., Donora, brick, steel elementary and junior high school, Shaler Twp., near here. $250,000.

Pa., Morganza—Dpt. Welfare Training School, Commonwealth of Pennsylvania, W. F. Penn, supt., new buildings, improvements to State Training School, on campus. $270,000.

Pa., Muncy—Muncy Boro & Muncy Creek Twp. plans by Lawrie & Green, 3rd and Forster Sts., Harrisburg, brick, steel school. $200,000.

Pa., Pittsburgh—Bd. Educ., H. W. Cramblet, secy., Administration Bldg., plans by R. M. Trimble, 709 Ferguson Bldg., and takes bids early in fall. William M. Davidson High School, brick, steel, West Liberty St. $600,000.

Pa., Polk—Polk State School, H. M. Watkins, supt., new buildings, improvement to State School and Hospital, Institute St. $453,500.

Tex., College Station—A. and M. College, c/o Bd. Regents, plans by F. E. Giesecke, college archt., College Station, 2-3 story, brick, rein.-con. chemistry building, plain found., $350,000; 2 or 3 story, brick, steel, rein.-con. agricultural engineering building, incl. new mechanical equipment, plain found. $200,000. Noted May 28.

Tex., Galveston—Bd. Educ., c/o E. G. Littlejohn, Galveston, sketches by D. McKenzie, Galveston and M. Lemon Constr. Industrial Bldg., Dallas, West Dist. Negro School, incl. auditorium, cafeteria, brick, tile. $200,000.

Tex., San Antonio—Bd. Educ. Lavaca St., soon lets contracts 1 story, part basement, 90 x 170 ft. negro high school, brick, rein.-con., plain found., Monumental and Nebraska Sts. $150,000. Phelps & DeWees, Bd. Architects, Gunter Bldg., archts.

Tex., San Marcos—Bd. Educ., c/o Secretary, plans by H. P. Smith, Natl. Bank of Commerce Bldg., San Antonio, new high school, grammar school, auditorium, cafeteria, gymnasium, $200,000. W. E. Simpson Co., Natl. Bank of Commerce Bldg., San Antonio, structural engrs. Noted Apr. 2.

Va., Norfolk—City sketches Junior High School. $600,000.

Vt., Bennington—Bennington College, R. E. Leigh, New York, plans by J. W. Ames & E. S. Dodge, 148 State St., Boston, Mass., and takes bids about September, several dormitories, class room, administration and library building, Elm St. To exceed $1,000,000. Noted June 4.

BIDS ASKED

Calif., San Francisco—July 17, by Bd. P. Wks., City Hall, 2 story, rein.-con. addition to West Portal School, Claremont Blvd., for City and San Francisco Co. $175,000. S. J. Hester, secy., Bd. P. Wks.

Conn., Storrs — July 18, by Connecticut Agricultural College, C. C. McCracken, pres., brick, stone faculty building and infirmary addition. $150,000. Perry & Bishop, 17 Court St., New Britain, archts. Noted July 2.

Del., Milford—July 10, by Delaware School Foundation, Du Pont Bldg., Wilmington, 2 story, basement, brick, steel addition to grade and high school, plain found. $150,000. Guilbert & Betelle, 20 Branford Pl., Newark, N. J., archts. Noted July 2.

Del., Millsboro — July 10, by State School Building Comn., H. U. Holloway, supt., Dover, 2 story, basement, brick, steel, plain found. $150,000. Guilbert & Betelle, 20 Branford Pl., Newark, N. J., archts.

Ill., Ottawa—July 15, by Bd. Educ., 1 and 3 story, 130 x 156 ft., and 120 x 156 ft. school. $300,000. Llewellyn & Llewellyn, 38 South Dearborn St., Chicago, archts. Noted May 21.

Ind., Brookston—July 10, by School Comrs. Carroll Co., 70 x 110 ft. brick, steel, stone school. $150,000. W. G. Rammel, Logansport, archt. Noted Apr. 16.

Me., Farmington—Town, School Dpt., taking bids 2 story, basement, brick, stone school, plain found., Quebec St. $150,000. Coombs & Harriman, 11 Lisbon St., Lewiston, archts. Noted May 28.

Mass., Somerville (br. Boston)—St. Catherine's Roman Catholic Parish taking bids altering and constructing 3 story, basement, brick, stone convent addition, plain found., Summer and Belmont Sts. $150,000 or more. Hefferman & Gray, 175 High St., Boston, archts.

Mass., Weston—Cambridge School, J. R. French, 36 Concord Ave., taking new bids 2 and 3 story, basement, brick, dormitory, administration building and gymnasium, plain found., Trapelo Rd. $150,000 or more. Kilham, Hopkins & Greeley, 9 Park St., Boston, archts. Former bids rejected. Noted Apr. 16.

N. J., Clifton—Bd. Educ., High School, bids about Sept. 15, 2 story, basement, brick, steel, rein.-con. school addition, Gregory Ave. $150,000. Lee & Hewitt, 152 Market St., Paterson, archts. Noted June 11.

N. J., Kearny (sta. Arlington)—Bd. Educ., Devon St., bids about Sept. 1, altering and constructing 2 story, basement, brick, steel addition, Magnolia Ave. $150,000. Guilbert & Betelle, 20 Branford Pl., Newark, archts. Noted June 18.

N. J., Middlebush—Bd. Educ. Franklin Twp., R. W. Thomson, comr. Buildings and Grounds, bids about Aug. 1, 2 story, basement, brick, steel, West Side. $150,000. J. N. Pierson & Son, 198 Jefferson St., Perth Amboy, archts.

O., Bexley — July 27, by Bd. Educ., J. L. Henney, clk., Junior High School, 2 and 3 story, basement, 157 x 345 ft., brick, stone, concrete, Cassingham Rd. $340,000. Miller & Reeves, 203 East Broad St., Columbus, archts. Noted May 7.

Pa., Arnold—July 13, by Bd. Educ., C. L. Cotton, pres., 2 story, 23x120 ft., brick, steel trade school, Woodmont St. $150,000. P. R. L. Hogner, Smithfield Bldg., 6th and Smithfield Sts., Pittsburgh, archt.

Pa., Springdale—July 14, by Bd. Educ., B. D. Remaley, secy., 511 Roslyn Ave., 2 story, part basement, brick, steel high school, Colfax St. $150,000. J. H. Phillips, Wabash Bldg., Pittsburgh, archt. Noted June 19.

Tenn., Nashville—Aug. 11, by Bd. Educ., East Nashville Senior High School, 3 story, basement, 250 x 300 ft., incl. 1,500 seating capacity auditorium, 500 seating capacity cafeteria, 10,000 seating capacity concrete stadium, for Bd. Educ. Marr & Holman, Stahlman Bldg., archts.

CONTRACTS AWARDED

Ariz., Tucson—Pima Co. School Dist., c/o W. A. Jost, clk., Roskruge Junior High School, to J. J. Garfield, Tucson, $140,800.

Calif., San Francisco—City and San Francisco Co., general contract 2 story, basement, brick, steel addition to girl's High School, to Mahony Bros., Flood Bldg., $204,800.

Ind., Munster—School Comrs., general contract, brick, steel school, to W. Christianson, Griffith. Est. $150,000.

Ind., Oakland City — School Comrs., general contract 2 story, basement, 119 x 126 ft., brick, steel, stone high school, incl. library, gymnasium, auditorium, to Shelby Constr. Co., Shelbyville. Est. $150,000. Noted May 21.

Ky., Ludlow—Bd. Educ., 2 story, basement, 90 x 218 ft., rein.-con., brick, Elm St., to W. B. Catching & Co., Lexington, $116,520.

Md., Baltimore—Bd. Awards, Garrett Heights School, 2 story, basement, brick, cut stone, hollow tile, marble, to J. L. Robinson Contg. Co., 522 Park Ave. Est. $150,000. Noted June 18.

Md., Brooklyn (sta. Baltimore)—Bd. Awards, Baltimore, 2 story, brick, hollow tile, limestone, granite, structural steel school addition, to C. L. Stockhausen Co., Gay and Water Sts., Baltimore, $62,360. Noted June 11.

Mass., Arlington — Town, Bd. Selectmen, 2 story, basement, brick, steel high school addition, plain found., to John W. Duff, Inc., 146 Summer St., Boston. Est. $150,000. Noted June 4.

Mass., Brighton (sta. Boston)—St. Columbkille's Roman Catholic Church, J. V. Tracy, pastor, 321 Market St., altering and constructing 2 story, basement, 55 x 130 ft., brick school addition, plain found., to Charles Logue Building Co., 18 Tremont St., Boston. Est. $150,000 or more. Noted June 18.

Mass., Framingham—Town, R. Kerwin, chn. Building Comn., altering and constructing 3 story, basement, brick, stone high school addition, plain found., to T. A. Sheehan, 403 Union Ave. Est. $150,000. Noted June 18.

Mass., Lawrence — City, Superintendent Schools, to Stephen D'Urso & Sons Co., 4 Loring St., 2 story, basement, 70 x 110 ft. school, Park, Trenton and Lexington Sts., $84,997; 2 story, basement, 60 x 95 ft. school, South Broadway, Chester and Bowdoin Sts., $74,520; 2 story, basement, 50 x 120 ft. school, Pleasant and Woodland Sts., $89,501, all brick, stone, cast stone. Grand total $249,018. Noted June 25.

Mass., Watertown—Rosary Academy, M. Victorine, 3 story, basement, 75 x 110 ft., brick, concrete parochial boarding school, Lexington St., to Martin W. Ryan, Inc., 763 Mass. Ave., Cambridge. Est. $150,000. Noted June 18.

Mich., Quincy—Bd. Educ., 2 story, basement, brick, steel, rein.-con., plain found., to A. F. Evans, Cheyenne Ave. and Six Mile Rd., Detroit. Est. $150,000.

Mo., St. Louis—Washington University, G. R. Throop, chancellor, Skinker and Lindell Blvds. general contract School of Architecture, 3 story, basement, 60 x 208 ft., concrete, brick, granite, Forsythe St., west of Skinker Ave., to James Black Masonry & Constr. Co., 801 Louderman Bldg. Est. $300,000. Noted May 15.

N. J., Summit—W. S. Bessell, archt., 420 Madison Ave., New York, dormitory for Kent Place School, to White Constr. Co., 95 Madison Ave., New York. Est. $250,000. Noted June 4.

N. J., Washington—Bd. Educ., C. C. Bowers, dist. clk., general contract 2 story, basement, 115 x 150 ft., brick, steel, rein.-con. high school, North Carlton Ave., to H. E. Stoudt & Son, 424 2nd Ave., Bethlehem, Pa.; heating and plumbing, to G. H Van Varick, 28 Hillman St, Clifton; electrical work, to G. G. Williams, 19 Franklin Terrace, Irvington. Est. 150,000. Noted June 11.

N. Y., New York—Catholic Institute for Blind, J. G. Neeser, 3 story, basement school, to W. Berbusse, 35 Bush Ave., Port Chester, Est. $150,000. Noted June 18.

Pa., Lawrence Park—Bd. Educ., P. Gill, secy., general contract 2 story, basement, 95 x 145 ft., brick, steel high school, to Continental Constr., 1721 Ash St., Erie, $81,444; plumbing, to Wm. M. Clark & Co., 297 South Beaver St., New Castle, $5,690; electrical work, to Northwest Electric Co., Erie, $7,048. Grand total $94,182. Noted June 18.

Pa., Pittsburgh—Bd. Educ., H. W. Cramblet, secy., Administration Bldg., general contract 2 story, part basement, 51 x 140 ft. addition to Larimer Elementary School, rein.-con., tile, brick, stone, slab, to Navarro Co., 6219 Broad St., $148,000; plumbing and heating, to Moss & Blakely Co., 223 Baltzhoover Ave., $28,199 unit heaters, to Herman Nelson Corp., 320 Pennsylvania Ave., $777. Grand total $176,976. Noted Jan. 11.

Pa., Villa Nova—Augustinian College, 2 story, basement, 138 x 193 ft., steel, brick, limestone gymnasium, fieldhouse, campus, to Wark Co., 1608 Walnut St., Phila.

R. I., Middletown—St. George's School, c/o Howe & Church, archts., Turks Head Bldg., Providence, (2nd unit) 2 story, basement, brick, stone, steel infirmary, plain found., to J. G. McPherson & Son, 86 Weybosset St., Providence. Est. $150,000.

THEATRES

PROPOSED WORK

Calif., Los Angeles—West Coast Amusement Co., 1927-37 San Fernando Rd., plans by R. L. Warren, 115 East Philadelphia St., 3 story, basement, 130 x 218 ft., rein.-con., stone, stucco, amusement building, 1927-37 San Fernando Rd., $225,000.

Calif., Stockton—July 9, by Bliss & Fairweather, archts, Balboa Bldg., San Francisco, 2 story, Class A rein.-con., steel theater, Main St., for National Theatre Syndicate, Inc., 25 Taylor St. $300,000. Noted June 19.

D. C., Wash.—Owner, c/o W. W. Jordan, 710 McLachlen Bank Bldg., 11 story, 300 x 500 ft., steel, rein.-con., limestone, theatre, retail merchandise mart, incl. parking space, swimming pool, bowling alleys and roof garden. $10,000,000. O. H. Miller, McLachlen Bank Bldg., archt.

N. Y., Brooklyn—Mansfield Impvt. Co., 596 Fulton St., plans by C. A. Sandbloom, 145 West 45th St., New York, 2 story or more, 100 x 120 ft. theatre, stores, Avenue U and Mansfield Rd. $150,000.

BIDS ASKED

N. J., Red Bank—Red Bank Amusement Co., c/o Boylan & Levine, archts., 143 Albany St., New Brunswick, bids about July 15, general contract 2 story, basement, brick, steel, rein.-con. theatre. $200,000. Noted June 25.

Tex., Del Rio—P. J. Poag, et al., c/o Princess and Casino Theatres, taking bids 3 story, rein.-con., steel, brick theatre, plain found. $135,000—$150,000. Private plans. Noted Apr. 30.

CONTRACTS AWARDED

Ind., Angola—Westley Corp., 228 North La Salle St., Chicago, Ill., 2 story, basement, 60 x 200 ft., brick, steel, stone theater, to C. W. Holland, Angola. Est. $150,000. Noted Apr. 30.

BANKS

PROPOSED WORK

N. Y., Brooklyn—Brevoort Savings Bank, 522 Nostrand Ave., sketches by Halsey, McCormack & Helmer, 286 5th Ave., New York, bank addition. Noted Feb. 26.

Tex., Tyler—People's Natl. Bank, c/o S. R. Greer, Tyler, 8-10 story, basement, 60 x 10 ft., brick, rein.-con. bank, office, plain found. $250,000. Architect to be selected in a few days.

CONTRACTS AWARDED

Conn., Middletown—Farmers & Mechanics Savings Bank, J. K. Guy, pres., 189 Main St., altering and constructing brick, steel bank addition, excavation work, found. and masonry, to Dennis O'Brien & Sons, 15 McDonough Pl.; plumbing, heating and electrical work, to Hoggson Bros., 485 5th Ave., New York. Est. $150,000. Noted May 21, under "Contracts Awarded."

Mass., Hudson—Hudson Savings Bank, G. Gilman, pres., 42 Main St., remodeling two 1 story, basement, brick, concrete, steel buildings for 2 banks, Hudson Savings and Hudson National, plain founds., Main St., to A. L. Fletcher, 90 Warner St. Est. $150,000.

N. J., Harrison—Harrison-Kearny Trust Co., M. Riordan, 117 Harrison Ave., taking bids altering and constructing 2 story, basement, brick, steel bank addition, 710 North 4th St. $150,000. Salmond-Scrimshaw & Co., 526 Elm St., Arlington, archts. and engrs.

OFFICES

PROPOSED WORK

Mo., St. Louis — Union Electric Light & Power Co., 12th and Locust Sts., 3 story, 57 x 62 ft., rein.-con., brick, steel top addition to office building, 12th and Locust Blvds. Klipstein & Rathmann, 316 North 8th St., archts.

N. Y., New York—Corporation, c/o A. W. Ahleschlager, archt., 565 5th Ave., general contract office, store, 41st St. and 6th Ave. $2,000,000. Project indefinitely in abeyance. Noted May 14.

N. Y., Watertown — Medical Arts Building, Inc., Washington and Clinton Sts., soon takes bids 6 story, steel, concrete, brick medical arts building. $300,000.

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Offices (Continued)

CONTRACTS AWARDED

W. Va., Charleston—C. & P. Telephone Co., 7 story, basement, 96 x 123 ft., brick, granite, limestone, concrete offic., to Consolidated Eng. Co., 20 East Franklin St., Baltimore, Md.

STORES

PROPOSED WORK

Mass., Northampton—H. I. Shackley, c/o Krokyn & Browne, archts., 120 Milk St., Boston, soon lets contract, 1 story, basement, 125 x 135 ft., brick, stone store, West and Green Sts. $150,000. Noted June 18.

N. J., Asbury Park—J. Ackerman, 404 Asbury Ave., revised sketches by C. B. Cook, 505 Bond St., 2 story, basement, brick, steel store, office. $150,000. Noted May 28.

N. J., Newark—F. Schlather, 1029 South Orange Ave., 1 story, basement, brick, steel store, 1031 Orange Ave. $150,000. Bids in. Project in abeyance. C. L. Steinbrenner, 50 Pope Ave., archt. F. W. Woolworth Co., 661 Broad St., Newark, lessee. Noted June 18.

BIDS ASKED

N. J., Union City — W. P. Keane, 317 Monastery Pl., bids about July 15, general contract 2 story, basement, 75 x 100 ft., brick, steel store, office, Bergenline Ave. and 36th St. $150,000. P. A. Vivarrtas, 110 48th St., archt. Noted June 25.

PUBLIC

PROPOSED WORK

Me., Bangor—PUBLIC LIBRARY—Bangor Public Library, E. T. Boyd, librarian, plans by E. L. Tilton, 420 Lexington Ave., New York, library additon. To exceed $250,000. **Maturity indefinite.**

Mass., Boston—OFFICE—Commonwealth of Massachusetts, Dpt. P. Wks., sketches by E. T. P. Graham, 171 Newbury St., 8 story, basement, brick, stone, steel, Nashua St. corner Lowell St. $1,500,000. Noted Jan. 15.

Mass., Brighton—LIBRARY—City of Boston, Library Dpt., F. W. Buxton, chn. Bd. Trustees, Copley Sq., Boston, rejected bids June 16, 2 story, basement, brick, limestone branch library, plain found., Fanuel Sect. $200,000. Kilham, Hopkins & Greeley, 9 Park St., Boston, archts. Few of lowest bidders to refigure on slightly revised plans. Noted June 4.

Mass., East Boston (sta. Boston) — AIR CORP — Commonwealth of Massachusetts, Natl. Guard Arniory Comn., State House, Boston, sketches by C. F. Springall, 50 Park St., Malden, 1 and 2 story, 180 x 200 ft., brick, concrete, steel air corp building, concrete found., at airport. $250,000.

Mass., Tewksbury—DORMITORY—Commonwealth of Massachusetts, J. B. Nichols, supt. State Infirmary, brick dormitory for men and employees building. $150,000. Architect not selected.

Mich., Caro—COURT HOUSE—Bd. Supervs. Tuscola Co., Caro, plans by W. M. Kuni, 1005 Francis Palms Bldg., Detroit, 2 story, basement, 75 x 130 ft., brick, steel, rein.-con., plain found. $200,000. Noted June 4.

N. J., Dover — LIBRARY — Bd. Trustees, 3 West Clinton St., will not build 1 story, basement, brick, steel library, $150,000. Project abandoned. Noted June 11.

N. J., Elizabeth—CITY HALL, etc.—Bd. City Comrs., City Hall, 10 story, basement, brick, steel, rein.-con., city hall, municipal building, $1,000,000. **Maturity indefinite.** Oakley & Son, 1259 Clinton Pl., archts. Noted Apr. 23.

N. J., Emerson — BORO HALL — Bd. Boro Council, F. Pasearell, mayor, will not build 2 story, basement, brick, steel. $150,000. Project abandoned. Architect not selected. Noted Apr. 9.

N. J., Hillside (sta. Hillside)—MUNICIPAL —Township Comn., Township Hall, will not build 2 story, basement, brick, steel. $150,000. Project abandoned. Noted Oct. 23.

N. J., Jersey City—ART MUSEUM—Bd. City Comrs., City Hall, 2 story, basement, brick, steel art museum. $150,000. **Maturity probably soon.** Architect not selected.

N. J., Paterson—OFFICE—Bd. City Comrs., City Hall, will not alter 4 story, basement, brick, steel Y. M. C. A. into office, 141 Ellison St. $150,000. Project abandoned. Architect not selected. Noted Oct. 2.

N. J., Union—MUNICIPAL—Township Com., Township Hall, 2 story, basement, brick, steel, Morris Ave. $150,000. **Maturity about September.** F. A. Elsasser, Morris Ave., archt. Noted May 7.

N. Y., Astoria—HEALTH CENTER, etc.—Dpt. Health, 505 Pearl St., New York, bids in November or later, baby health center, laboratory. $150,000. Noted Feb. 26.

N. Y., Brooklyn—FIRE HOUSES—Fire Dpt., J. J. Dorman, comr., Municipal Bldg., New York, plans by J. R. Sliney, 135th and Edwards Sts., two 2 story fire houses, one at South 2nd St. and Driggs Ave. and other at Avenue N and East 64th St. $150,000.

N. Y., Brooklyn—HEALTH CENTER, etc.—Dpt. Health, 505 Pearl St., New York, baby health center laboratory, Williamsburg Dist. $150,000. **Maturity in November or later.** J. Woolf, 505 Pearl St., engr. Noted Feb. 26.

N. Y., Jamaica—HEALTH CENTER, etc.—Dpt. Health, 505 Pearl St., New York, baby health center, laboratory. $150,000. **Maturity late in winter.** Noted Mar. 26.

N. Y., St. George—HEALTH CENTER, etc.—Dpt. Health, 505 Pearl St., New York, bids in November or later, baby health center, dental laboratory. Noted Feb. 26.

N. C., Waynesville—COURT HOUSE, etc.—Comrs. Haywood Co., c/o chairman, Waynesville, plans by W. G. Rogers & N. G. Rhodes, 404 South Tryon St., Charlotte, court house and jail. $250,000. Noted Mar. 12.

Okla, Tulsa—FIRE ALARM—City, Municipal Bldg., plans by Smith & Senter, 307 Philtower, part 1 and 2 story fire alarm building, Central Park. $275,000.

Tenn., Nashville—ADMINISTRATION, etc.—State soon takes bids 2 and 3 story administration and auditorium, agricultural and industrial building, women's building, gymnasium, and farm group. $1,000,000. W. R. McCornack, 10006 Carnegie Ave., Cleveland, O., archt.

Va., Danville—ARMORY, etc.—City, plans by J. B. Heard, Danville, new armory, auditorium. $150,000.

BIDS ASKED

Calif., Beverly Hills—CITY HALL—July 14, by City, Class A, city hall. $400,000. Koerner & Gage, 368 North Camden Dr., archts. Noted June 4.

Calif., Santa Barbara—SCIENCE—July 21, by State Dpt. P. Wks., Sacramento, 3 story, rein.-con. science building, 24,000 sq.ft. floor space.

Calif., San Francisco—VETERANS' MEMORIAL and OPERA HOUSE—San Francisco War Memorial Bd., taking bids lathing, plastering, electrical and sheet metal work at memorial, Civic Center, for City and San Francisco Co. Total est. $2,500,000 each.

N. H., Claremont—ARMORY — July 14, by State, armory. $150,000. Noted Jan. 1.

N. Y., New York—COURT HOUSE—H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., bids about Aug. 15, general contract 14 story, county court house, etc., Grand Concourse, 158th and 161st Sts. $7,000,000. J. H. Freedlander, 681 5th Ave., and M. Hausle, 3307 3rd Ave., archts. Noted June 11.

Pa., Allentown—ADMINISTRATION—July 13, by Jacoby & Everett, archts., Commonwealth Bldg., 3 story, basement, 45 x 150 ft., steel, plain found., 1903 Turner St., for Phoebe Home, F. H. Moyer, supt.

CONTRACTS AWARDED

Mass., Jamaica Plain (sta., Boston) — LIBRARY — City of Boston, Library Dpt., Copley Sq., 1 story, basement, brick, stone branch library, plain found., Boylstone Sect., to C. Graglia & Sons, 15 Stanley St., Dorchester. Est. $150,000. Noted June 4.

SCHOOLS

N. Y., Kingston—ARMORY—Adjutant General, Capitol, Albany, general contract armory, to C. M. McLean & Sons, 332 Water St., Binghamton, $229,400; heating, to E. W. Tompkins Auburn; $19,639; sanitary work, to L. F. Bannon, Andrew St., Kingston, $14,368; electrical work, to Stearns Electric Co., 108 Hamilton St., Albany, $8,436. Grand total $271,843. Contract awarded in June. Noted May 7.

N. Y., Newburgh—Adjutant General, Div. Military & Naval Affairs, Capitol, Albany, general contract armory, to Miller & Gaynor, 1 Clinton St., Poughkeepsie, $239,500; sanitary work, to L. F. Bannon, 16 Andrew St., Kingston, $15,589; heating, to J. W. Danforth, 70 Elliott St., Buffalo, $18,804; electrical work, to Central Electric Co., 372 Warren St., Hudson, $8,468. Grand total $282,361. Contract awarded in June. Noted May 7.

N. Y., Syracuse—ARMORY—Adjutant General, Div. Military & Naval Affairs, Albany, general contract state armory addition, to W. F. Hendrick Co., 241 Euclid Ave., Cleveland, O., $159,000; heating, to F. Group & Sons, 607 Salina St., $6,339; sanitary work, to E. Joy, 133 Market St., $7,262; electrical work, to Doster & Egan, 222 West Newell St., $5,627. Grand total $178,228. Noted May 21.

Pa., Franklin—COURT HOUSE—Venango Co., Z. Smiley, clk., general contract 2 story, basement, 46 x 80 ft., brick, stone, limestone, steel, tile, rein.-con., to J. E. Ludwig, 207 East 7th St., Oil City, $61,990; plumbing, to Franklin Hardware & Plumbing Co., Franklin, $3,678. Noted June 4.

Pa., Pottsville — COURT HOUSE — Comrs. Schuylkill Co. altering and additions to court house, to Bastress Constr. Co., Mt. Carmel, $195,682. Noted Aug. 21.

R. I., Providence — COURT HOUSE—State, County Court House Comn., W. B. Greenough, 30 South Main St., general contract 8 story, brick, stone addition, to J. W. Bishop Co., 1415 Turks Head Bldg., $1,147,630; heating and ventilating, to Lincoln & Lane Co., Pawtucket, $82,500; electrical work, to Scannevin & Potter, 189 Pine St., $17,978. Grand total $1,248,108. Noted June 11.

Tenn., Huntingdon—COURT HOUSE—D. D. Maddox, secy., Carroll Co., 2 story, basement, rein.-con., limestone, brick, incl. auditorium, kitchen, to Chamber & Highway, Athens, Ala., $89,909. Noted June 11.

UNCLASSIFIED

PROPOSED WORK

Mich., Detroit—HEADQUARTERS—Salvation Army, 564 Michigan Ave., plans & F. Eurich, Jr., 2539 Woodward Ave., 4 story, basement, 100 x 200 ft., brick steel, rein.-con., plain found., 2nd Blvd. and Henry St. $350,000.

N. Y., Brooklyn—MAUSOLEUM—Holy Cross Cemetery, T. E. Molloy, pastor in charge, 75 Greene Ave., plans by G. B. Webb, 10 East 43rd St., New York, mausoleum, $190,000.

New York—EXCHANGES—See "Unclassified."

Pa., Phila.—TEMPLE of MUSIC and DRAMA —Philadelphia Arts Assn., c/o Curtis Institute, 1726 Locust St., temple of music and drama. **Maturity about November.** Voorhees, Gmelin & Walker, 101 Park Ave., New York, archts. Noted July 2.

BIDS ASKED

Mass., Worcester—HOME—Jewish Home for Aged & Orphans, S. Wexler, chn. building com., 390 Main St., taking preliminary bids 3 story, basement, 90 x 130 ft., brick, stone, steel, tile, plain found., Pleasant St. near Moreland St. $150,000. Fuller & Delano, 44 Front St., archts. Noted June 4.

CONTRACTS AWARDED

N. J., West Long Branch — MAUSOLEUM — Glenwood Mausoleum Assn., B. P. Morris, pres., 1 story, basement, brick, steel separate contracts. $250,000. **Maturity in August or later.** G. B. Webb, 10 East 43rd St., New York, archt. Noted June 18.

Industrial Buildings

FACTORIES AND MILLS

PROPOSED WORK

Calif., Alameda—GLASS FACTORY—Owens-Illinois Glass Co., 133 Kearny St., San Francisco, completing plans glass factory, Fernside Tract. $1,500,000. Engineering Dpt., Engineers' Bldg., Cleveland, O., engrs.

Calif., Chino—DAIRY PLANT—B. E. Carter plans by H. W. Bishop, 6432 Moor Dr., Los Angeles, rein.-con. $1,000,000.

Calif., Fresno—PRECOOLING PLANT—N. D. and S. Naman, 3232 East Tulare St., and H. Krum, 311 Broadway, 2 story, rein.-con., G St.

Conn., New Haven—LABORATORY—Connecticut Agricultural Experimental Station, Huntington Rd., sketches by D. Orr, 956 Chapel St., Jenkins Laboratory for Agricultural Experimenting, brick, Huntington Rd. $50,000.

N. J., Bound Brook—FACTORY—Pathe Exchange, Inc., Middlesex Boro, will not build 1 story, basement, brick, steel. $40,00. Project abandoned. Noted June 11.

N. J. Carteret — PLANT — Amer. Mineral Spirits Co., 205 East 42nd St., New York, 1 story, basement, petroleum products plant, tanks, brick, steel, William and Clark Property. $40,000. Project in abeyance. Noted July 2.

N. J., Maplewood—GOLF CLUB FACTORY—Kroydon Co., Burnet Ave., 1 story, basement, brick, steel. $40,000. Bids in. Project in abeyance. D. A. Hopper, 22 Ridgewood Ave., Irvington, archt. Noted June 18.

N. J., Spotswood—RUG MILL—Spotswood Rug Mills, Inc. will not build 2 story, basement, brick, steel. $40,000. Project abandoned. Noted June 4.

Pa., Carnegie—PAPER PLANT—Braziell & Anderson, archts., 309 4th Ave., Pittsburgh, soon lets contract Unit 1, 1 story, basement, 80 x 180 ft., concrete block, steel, Rob. Twp., for Superior Paper Products Co., Carnegie. Est. $50,000.

Pa., Scranton—RAYON MANUFACTURING PLANT—Princeton Rayon Co., 150 Madison Ave., New York, will not build plant, here. Purchased plant at Waterbury, Conn., instead. Minor alterations and equipment required at new plant. Noted July 2.

Tex., Cuero—FACTORY—Cuero Bag, Awning & Tent Co., 1 story, 60 x 110 ft., brick, concrete, corrugated iron factory. Private plans.

Tex., Galveston—PLANT—Stability Leather Good Mfg. Co., 2705 Oliver St., St. Louis, Mo., sketches leather goods plant. $100,000.

Tex., Gladewater—REFINERY—R. E. Burnett Associates, Gladewater, refinery plant, near here. $140,000. Private plans.

Tex., Overton—SKIMMING PLANT—All-States Refining Co., Thrall, skimming plant, 4,000 bbl. capacity, near here. $50,000. Private plans.

Tex., Overton—SKIMMING PLANT—Central Refining Plant, c/o G. Griswold, Overton, skimming plant, 7,500 bbl. capacity, halfway between here and Henderson at Friar Switch on International & Great Northern Ry. $100,000. Private plans.

Va., Norfolk—FACTORY—Amer. Peanut Co., 603 Water St., will not rebuild 5 story, brick warehouse, destroyed by fire, Water St. Project abandoned. Noted June 19.

Newfoundland, St. Johns—PLANT—Northern Products Ltd., L. F. Merrylees, engr., plant to develop shell deposits on Labrador Coast. $50,000, incl. machinery, equipment.

BIDS ASKED

N. J., Wallington — BAKERY, etc. — J. T. Camlet, archt., 26 Piaget Ave., Clifton, taking new bids general contract 2 story, basement, 75 x 75 ft., brick, steel bakery plant, store, garage, Wallington Ave. and Mercer St., for J. Boruta, 103 Halstead St. $40,000. Noted June 4.

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W

hat!

increase our appropriation in July?

It's an old custom with many manufacturers to curtail advertising when summer comes round. What they say in effect is, "We hereby notify everybody that we do not expect to do business during the vacation period."

But we believe advertising is a 12 months' operation for every company that keeps salesmen on the job the year round. We believe the company that can afford to let up in July and August can afford to let up in October and January.

We believe, too, that the business man, the merchant, the engineer is going to read his business paper more than ever this summer. The reason must be obvious to anyone who knows what business is doing now to make short cuts to profits.

Because we really believe these things, McGraw-Hill is increasing its advertising appropriation to launch a supplementary campaign in business publications just as summer begins.

In other words, we are notifying business men who use advertising and business men who ought to use it that we are not only open for business in July and August but that we are going out after it. These advertisements tell *what business paper advertising can do for you right now.* They point the way for you to *invest* your money in business publications for effective results.

Salesmen never needed hard-hitting advertising more than they do now. Give them help. Increase your advertising at once. Your advertising manager or agent knows how. Get him at work. Orders won't wait.

ENGINEERING NEWS-RECORD

Willard Chevalier

Publishing Director

Factories and Mills (Continued)

CONTRACTS AWARDED

Calif., San Jose—CEMENT PLANT—San Jose Cement Co. Ltd., E. H. Dettner, pres., 839 Howard St., San Francisco, cement plant, 3,500 bbl initial capacity, 8 mi. southwest of here, on Southern Pacific R.R., to Hunt-Mirk & Co., 141 2nd St., San Francisco; furnishing kilns and mills, to Polysius Corp., Bethlehem, Pa. $2,250,000.

Calif., Vallejo—LAUNDRY—Vallejo Steam Laundry, 301 Pennsylvania St., part 1 and 2 story, 60 x 140 ft., rein.-con., to G. Barenchi, Vallejo.

Ill., Chicago—FACTORY—Barrett Bindery Co., 1330 Monroe St., 4 story, brick addition, to B. W. Constr. Co., 720 North Wabash Ave., $50,000.

Ill., Cicero—FACTORY—Western Electric Co., Hawthorne Works, C. L. Rice, vice-pres. and 2511 West 23rd St., Chicago, superstructure 6 story, 75 x 250 ft. and 1 story, 300 x 375 ft. factory, to Ouilmette Constr. & Eng. Co., 200 East Walton Pl., Chicago. Est. $1,000,000.

Mass., Cambridge—CLEANSING PLANT—H. J. Shea & Co., 2225 Mass. Ave., 1 story, basement, brick, steel, concrete found., to J. J. Powers Co., 33 Myrtle Ave. Est. $40,000. Noted Apr. 30.

Mass., Everett—PLANT—Merrimac Chemical Co., Chemical Lane, 1 story, brick, steel alum process building, plant unit, plain found., to J. F. Griffin Co., 250 Stuart St., Boston. Est. $40,000. Noted June 25.

Mass., Taunton—FACTORY—Taunton Pearl Wks., 35 Vernon St., altering and constructing 2 story, basement, brick, timber additions, plain founds., to L. J. Young, 469 Cohannet St. Est. $50,000. Noted June 18.

Mo., St. Louis—FACTORY—Old Peacock Sultan Co., 112 North 2nd St., 4 story, basement, 40 x 125 ft., rein.-con., brick, steel, to W. C. Harting Constr. Co., 1101 International Bldg. Noted Apr. 30.

N. J., New Brunswick—CLOTHING FACTORY—H. C. Bach, archt., 63 Schureman St., general contract 3 story, basement, 75 x 205 ft., brick, steel addition, Remsen Ave., to I. Cassera, 63 Hale St.; plumbing, to H. R. Singer, 411 Raritan Ave., Highland Park; heating, to Burns, Lane & Richardson, 307 Burnet St. Est. $125,000. Noted June 18.

N. Y., Brooklyn—RUBBER FACTORY—Rand Rubber Co., Halsey St., altering and constructing 3 story, Halsey St. and Sumner Ave., to Sracer & Tueru, c/o owner. Noted July 2.

N. Y., Eastview—LAUNDRY—Bd. Supervs. Westchester Co., F. L. Merritt, White Plains, laundry, at Grasslands Hospital, to T. and A. Miller, Tuckahoe Rd., Yonkers. Est. exceeds $150,000. Noted June 25.

O., Zanesville — FACTORY — Weller Pottery Co., 1 story, brick, steel, concrete addition to Plant 3, Ceramic Ave., to Austin Co., Union Trust Bldg., Pittsburgh, Pa., $100,000.

Pa., Bradford—REFINING PLANT—Kendall Refining Co., steel cracking unit for oil refinery, to Arthur G. McKee & Co., 2422 Euclid Ave., Cleveland, O. Est. $350,000.

GARAGES

PROPOSED WORK

Ga., Atlanta — Jones Estate, c/o Harrison Jones, 310 North Ave., soon lets general contract 1 story, 73 x 160 ft., brick, structural steel, rein.-con. garage, 1104 Peachtree St. Universal Garage, 1012 Peachtree St., lessee. H. F. Wild, 310 North Ave., structural engr.

Mass., Roxbury (sta. Boston) — Roxbury Crossing Service Station, Columbus Ave., rebuilding 1 story service station and storage building, Columbus Ave. $50,000 or more. Architect not selected.

Mass., Somerville—City, J. J. Murphy, City Hall, garage. $100,000 or more. Architect not selected.

N. J., Oakhurst—S. Schultz, Colonial Terrace, 1 story, basement, brick, steel auto repair shop, garage, Colonial Terrace. $40,000. **Maturity probably soon.** Architect not selected.

N. Y., Brooklyn—M. Astorita, 302 Sackett St., plans by I. Brooks, 16 Court St., 2 story, 70 x 100 ft. service garage, 3rd Pl. and Court St. $75,000.

N. Y., Brooklyn—Belfan Building Corp., B. Roth, pres., 26 Court St., sketches by M. Klein, 65 Court St., 100 x 170 ft. service garage, Grant St. and Morgan Ave. $40,000.

N. Y., Brooklyn — Camstall Constr. Co. M. Stolitsky, pres., 50 Court St., sketches by P. Freshman, 50 Court St., 1 story, 100 x 102 ft. service garage, 88th St. and 4th Ave. $40,000.

N. Y., Brooklyn—Court Square Sales & Renting Corp., c/o J. Weinstein, 26 Court St., 8 story, 100 x 159 ft. service garage, Boerum Pl. and Pacific St. $375,000. **Maturity in December.** J. S. Kennedy, 157 Remsen St., archt. Noted Oct. 10, 1929.

N. Y., New York—Randco Realty Corp., E. Alpern, secy., 527 Tiffany Ave., sketches by N. Rotholz, 155 East 42nd St., 100 x 100 ft. service garage, Tiffany and East Bay Aves. $40,000.

N. Y., New York—Dpt. Water Supply, Gas & Electricity, Municipal Bldg., plans by J. E. Kleist, 25 West 45th St., service building and garage, 155th St. and St. Nicholas Ave. $70,000.

BIDS ASKED

Ind., Indianapolis—July 14, by State Hy. Dpt., brick, steel garage and service building, 520 West Market St. $150,000. Vonnegut, Bohn-Mueller, 610 Indiana Trust Bldg., archts.

Mass., Barnstable—E. H. Corson, 6th and Elm Sts., taking bids 1 story, 65 x 100 ft. and ell, rein.-con., brick, stone, steel service garage, showroom, concrete found., Barnstable Rd. and Lewis St. $50,000. L. LaBrode, 888 Purchase St., New Bedford, archt. Noted July 2.

Mass., Salem—Estate of M. M. Creedon, 428 Essex St., P. Creedon, in charge, taking bids on revised plans, brick, concrete, steel garage addition, plain found., 430 Essex St. $40,000. Andrews, Jones, Biscoe & Whitmore, 50 Congress St., archts. Noted June 18.

N. J., Newark—See "Contracts Awarded."

N. Y., Brooklyn—See "Contracts Awarded."

CONTRACTS AWARDED

N. J., Newark—Owner, c/o Autocar Sales Co., lessee, Ardmore, Pa., will build 1 story, 100x300 ft. truck servicing and garage, Jefferson and Melbern Sts., day labor and separate contracts. $50,000.

N. Y., Brooklyn—M. S. Kaplow, 3114 Avenue M, 2 story, basement, brick service garage, West 4th St. and Avenue P, day labor and separate contracts. To exceed $40,000. **Maturity about December.** I. Kallich, 375 Fulton St., archt. Noted June 18.

POWER PLANTS

PROPOSED WORK

Ind., South Bend — Notre Dame University, plans by A. Kahn, Inc., Marquette Bldg., Detroit, Mich., brick, steel power plant addition, on campus. $50,000.

Mich., Detroit—Pub. Lighting Comn., East Atwater St., plans by Smith, Hinchman & Grylls, 800 Marquette Bldg., 2 story, basement, 50 x 50 ft., brick, steel, concrete substation, Warren and 14th Aves. $50,000.

N. Y., New York—Consolidated Gas Co., 4 Irving Pl., plans by J. F. Hunter, 4 Irving Pl., 3 and 5 story, 85 x 195 ft. generator house, Hunts Point Ave. and Bronx River. $500,000.

B. C., Kamloops—British Columbia Provincial Dpt. P. Wks., remodeling existing power plant at Tranquille Sanatorium, near here, incl. resetting 2 existing boilers, installing new high pressure return tubular boiler and new steam driven coal stoker as well as structural changes to power house. $40,000.

Man., Winnipeg — R. Morison, pres. British Dominions Power Syndicate, power plant on Nelson River on White Mud Falls. $1,000,000.

Que., D'Israeli—Shawinigan Water & Power Co., 107 Craig St. W., hydro-electric development on Upper St. Francis River. $500,000.

BIDS ASKED

Ind., Ft. Wayne—See "Churches."

N. J., Elizabeth—See "Contracts Awarded."

N. J., Irvington (br. Newark)—See "Contracts Awarded."

CONTRACTS AWARDED

Ia., Cedar Falls—State Bd. Edu., Des Moines, general contract 1 story, 54 x 135 ft., rein.-con., brick, steel heating plant, for Iowa State Teachers College, to Tapager Constr. Co., Albert Lea, Minn., $89,966. Noted June 11.

Me., West Peru—Berst, Foster Dixfield Co., F. W. Smith, mgr., 1 and 2 story, brick, steel power house and pump house, to J. H. Kerr, Prospect Ave., Rumford. Est. $40,000. Noted June 18.

N. J., Elizabeth—Elizabethtown Consolidated Gas Co., 16 West Jersey St., 2 story, basement, 50 x 100 ft., brick, steel, rein.-con power plant, boiler room, 3rd Ave., separate contracts. $40,000. Private plans. Noted June 11.

N. J., Irvington (br. Newark)—Pub. Serv. Electric & Gas Co., Terminal Bldg., Newark, 2 story, basement, 40 x 110 ft., brick, steel electric sub-station, Springfield Ave., separate contracts. $115,000. Private plans. Noted June 18.

N. Y., New York—Dpt. Hospitals, Municipal Bldg., converting 2 boilers in boiler room, Lincoln Hospital, to Kennedy Van Saun Mfg. Co., 2 Park Ave., $44,856. Noted June 25.

WAREHOUSES

CONTRACTS AWARDED

Calif., Oakland—City, Port Comn., superstructure Warehouse C, 2 story, 210 x 280 ft., rein.-con., on Outer Harbor, to Schuler & McDonald, 1723 Webster St., $167,775.

La., Lake Charles—Lake Charles Compress Co., four 110 x 160 ft., new cotton warehouse compartments, classing shed, compress building and brick boiler room, 160 x 200 ft. press room, all iron clad, timber construction, concrete founds., to J. A. Petty & Sons, Godchaux Bldg., New Orleans, $58,777.

Mass., Bridgton (station Boston)—International Harvester Co. of America, 61 North Beacon St., 1 story, 85 x 195 ft., brick, concrete storage building and service station addition, concrete founds., to Aberthaw Co., 80 Federal St., Boston. Est. $50,000. Noted June 18.

N. J., Jersey City—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, general contract 2 story, basement, brick, steel freight house, to E. J. Duffy, Inc., 303 West 42nd St., New York. Est. $150,000. Noted May 7.

N. J., Paterson—Great Atlantic & Pacific Tea Co., Sherman Ave. general contract altering 1 and 2 story, basement, 125 x 285 ft., brick, steel warehouse addition, to Austin Co., 120 Bway., New York, est. $150,000. Noted June 18.

O., Cincinnati — Cleveland Union Terminal Co., Temple Bar Bldg., Cleveland, 2 story, 70 x 740 ft., brick, steel, concrete express building, to Ferro Concrete Constr. Co., 203 West 3rd St. Est. $430,000. Noted June 11.

EARLY NEWS OF PROJECTS

The news items under this heading are obtained from various sources and where possible have been verified. The unverified items are obtained chiefly from press dispatches and are published at once for their timeliness.

Sewage disposal plants at Bessemer and Ensley, Jefferson County, Alabama, will probably be rebuilt in the near future according to W. D. Bishop, president of the County Commission. Mr. Bishop stated that both plants were constructed several years ago and have become obsolete and will have to be replaced. W. E. Corning, a member of the Commission and Claude J. Rogers, county engineer, are on a tour of Southern cities to study new types of disposal plants. On their return plans will be prepared and presented to the Commission.

Baldwin Locomotive Works has received an order from the Pennsylvania R.R. for 54 heavy passenger electric locomotives to cost $3,000,000. The parts will be fabricated and assembled at the Eddystone plant in the fall.

Candy factory building on the east side of 11th Ave. between 46th and 47th St., New York, was sold at auction July 1 to a client of Milburn, Tweed, Hope & Webb, attorneys, for $1,300,000. The building occupies a plot 200x350 ft., is 11 stories, and contains 500,000 sq.ft. of floor space.

The property of the United States Worsted Co., Boston, may be sold after Oct. 1, by ruling of the Massachusetts Superior Court on the petition of B. Loring Young, receiver for the company. One of the properties is the Lawrence Dye Works in South Lawrence, Mass., for the possession of which a banking group in New York is now negotiating. The other properties are the Silesia Mill at North Chalmsford, Md., the Musketaquid mill in Lowell, and the Uswogo mill in Lawrence.

Railroad bridge at Danville, Tenn., will be built by the Virginia Bridge & Iron Company, Birmingham, for the Louisville & Nashville Railroad Co. The project requires 3,100 tons of steel worth $400,000.

Japanese hydro-electric development of 100,000 kw. at Lake Jitsu-Getau-Tan will be completed by the proceeds of an offering of $22,800,000 of 40-year 5½ per cent gold bonds of the Tiawan Electric Power Co., Ltd., of Japan, through J. P. Morgan & Co., Kuhn, Loeb & Co., the National City Co., the First National Bank, and the Yokohama Specie Bank, Ltd. The offering is at 93½ and accrued interest to yield 5.9 per cent to maturity.

Two factories of the Kolster Radio Corporation at Newark which have been closed down for some months will be reopened by the Mackay Radio & Telegraph Co. Production will consist of the Kolster international radio broadcast receiver, the Kolster radio compass, and tubes.

Yakima River reclamation program has a construction value of $36,100,000. The Roza project, worth $14,300,000 is the fourth and latest unit to be approved by the state of Washington. The permit authorizes the federal reclamation bureau to use 1,150 sec.ft. of water from the Yakima River for this 90,000-acre project.

Alco Products, Inc., has received order from Amtorg Trading Corp. for five vacuum oil distilling units with combined capacity of 30,000 bbl. a day. Fabrication will be at the Dunkirk, N. Y., plant, and delivery starts in four months.

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